I/O News

Breakthrough in Robotics

Cromemco Introduces Eight New Boards

Accessing Terminal Attributes—'C' Language

THE OFFICIAL PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF CROMEMCO USERS

Volume Two, Number Six

Single Copy Price $7.50

New 256K Card Lowers the Cost of Memory

The new 256KZ from Cromemco brings the cost of RAM to the lowest ever for a Cromemco system—less than a half cent per byte. What's more this 256K RAM card can be configured as four 64K banks of memory, for use with Z-80 systems, or as 256K of contiguous memory, for use with 68000 systems. Just two 256KZ cards will support Z-80 CROMIX and six users (or tasks) with each user (or task) having a full 64K of memory. The same two 256KZ cards could provide 512K of contiguous memory in a 68000 system. And it takes just four cards for a full megabyte of memory.

For 68000-based systems (using the Cromemco DPU) the position of the 256KZ in address space is conveniently set by six on-board switches. These six switches are used to set the high-order address bits of the card (A18 through A23) so that the card can be placed anywhere in the 16-megabyte address space of the 68000. A seventh switch on the board is used to set power-on enable or disable.

For Z-80 based systems the 256KZ becomes the logical equivalent of four 64K cards. Rather than populate the 256KZ with four sets of bank select switches, the Cromemco engineers use a single on-board PROM to determine the banks in which each of the 64K segments of memory reside. This PROM (IC39 on the board) is normally a Cromemco 74947 which fills banks 0, 1, 2, and 3 with memory for three-user CROMIX systems and maps the other banks to bank zero. For a six-user CROMIX system two

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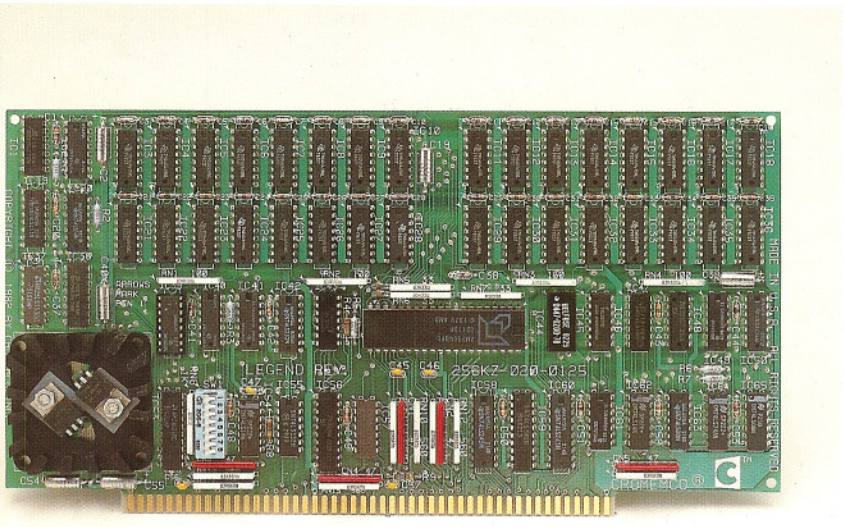

A Brief Overview of Two Vital Acronyms: CAD (Computer-Aided Design) and CAM (Computer-Aided Manufacturing)

by Jerrell M. Johnson

It has been predicted by many analysts that CAD/CAM can do a great deal toward correcting the productivity stagnation which threatens the ability of American industry to remain competitive on the world market. The thing that makes CAD such an effective way to design and analyze products and components is that computer graphics appeal to the most effective human communications channel—vision. The vision cortex, the part of the brain that responds to visual information, has a longer and more inclusive memory than the part that re-

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An Associative Data Base

by Trone L. Miller

(Author's Note: The first sentence of an article in another magazine asked: "How would you like to build a futuristic self-learning computer which is educated almost like a human child?" I have since discovered that scratching the surface of a "self-learning computer" can expose a very interesting data base inquiry system. I have published the fundamental information necessary to write such a system, and hope you will find this approach less restrictive than working from a listing. If, on the other hand, you would rather use my test program as a base from which to build, read on. You won't be disappointed.)

A few weeks ago, due to an ap-

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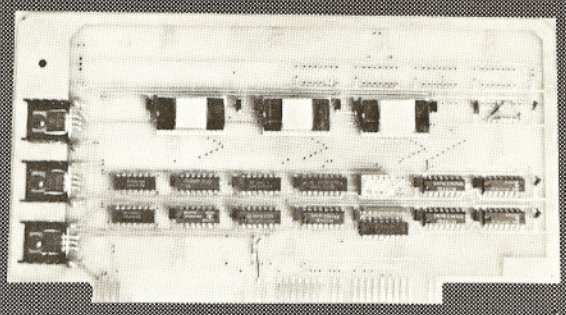
Micro Array Processor

Supercharge FORTRAN Math



S-100 BUS Computers such as Cromemco, run FORTRAN match calculations many times faster with the new Systems Atlanta Micro Array Processor.

Micro Array Processor

1) Hardware

a. Supports up to three AMD9511-AMD9512 floating point processor chips running at 2 or 4 MHz (berg jumper selectable for each individual chip allowing any mixture of fast/slow chips).

b. Addressed at 8 consecutive I/O ports on any 8-port boundry (berg jumper selectable I/O address).

c.

Typical Instructions	Time in Micro-seconds
-floating 32-bit addition	13-92
-floating 32-bit multiply	36-42
-floating 32-bit SINE	920-1202
-integer 16-bit multiply	21-23

d. Instruction Set includes:
-16-bit integer arithmetic, stack manipulations
-32-bit integer arithmetic, stack manipulations
-32-bit floating point arithmetic, trig, log, X**Y, stack manipulations, etc.

2) Software: MAP-48, a floating point library for use with FORTRAN IV

-Library allows parallel operations of host processor and Micro Array Processor
—Extensive error-trapping with easy-to-understand error messages
-FORTRAN IV programs which use extensive number crunching (particularly 32-bit integer) will execute up to 12 times faster with no source code modifications (relinking is required, of course).
-Programs are typically SMALLER when linked with the MAP-48 library.
-A library with no error-trapping is available on special request (where speed and/or memory size are critical).

The following arithmetic routines are contained in the library:

	Addition	
$AY	Integer*4	Integer
$A1	Integer*4	Integer*4
$AA	Real	Integer
$AE	Real	Integer*4
$AB	Real	Real
$AQ	Double	Integer
	Exponentiation	
$E9	Integer*4	Integer
$EA	Real	Integer
$EB	Real	Real
	Multiplication	
$M9	Integer	Ingeger
$MY	Integer*4	Integer
$M1	Integer*4	Integer*4
$MA	Real	Integer
$ME	Real	Integer*4
$MB	Real	Real
	Division	
$D9	Integer	Integer
$DY	Integer*4	Integer
$D1	Integer*4	Integer*4
$DA	Real	Integer
$DE	Real	Integer*4
$DB	Real	Real
	Subtraction	
$SY	Integer*4	Integer
$S1	Integer*4	Integer*4
$SA	Real	Integer
$SE	Real	Integer*4
$SB	Real	Real

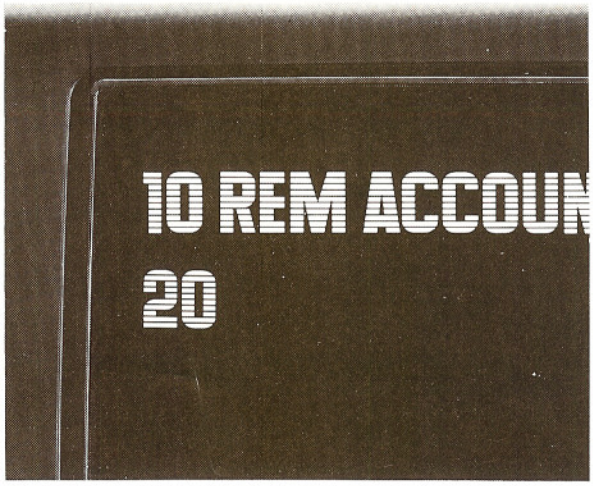
Additional Library routines are provided for converting between value types.
The Systems Atlanta Micro Array Processor is available exclusively from:

Royal Data, Inc.
2199 Garden Street
P.O. Box 2745
Titusville, FL 32780
(305) 267-1960 or 894-7641

Systems Atlanta, Inc.
Highway 92 West
Dixie Industrial Park
Woodstock, GA 30188
(404) 928-0240

DIVISIONS OF THE BUTLER-GRIFFITH GROUP, INC.

BOY, IS THIS COSTING YOU.



It's really quite basic: time is money.

And BASIC takes a lot more time and costs a lot more money than it should every time you write a new business software package.

Especially when you could speed things up with dBASE II.

dBASE II is a complete applications development package.

Users tell us they've cut the amount of code they write by up to 80% with dBASE II.

Because dBASE II is the high performance relational database management system for micros.

Database and file handling operations are done automatically, so you don't get involved with sets, lists, pointers, or even opening and closing of files.

Instead, you write your code in concepts.

And solve your customers' problems faster and for a lot less than with BASIC (or FORTRAN, COBOL or PL/I).

dBASE II uses English-like commands.

dBASE II uses a structured language to put you in full control of your data handling operations.

It has screen handling facilities for setting up input and output forms.

It has a built-in query facility, including multi-key and sub-field searches, so you can DISPLAY some or all of the data for any conditions you want to apply.

You can UPDATE, MODIFY and REPLACE entire databases or individual characters.

CREATE new databases in minutes, or JOIN databases that already exist.

APPEND new data almost instantly, whether the file has 10 records or tens of thousands.

SORT the data on as many keys as you want. Or INDEX it instead, then FIND whatever you're looking for in seconds, even using floppies.

Organize months worth of data in minutes with the built-in REPORT. Or control every row and column on your CRT and your printer, to format input and output exactly the way you want it.

You can do automatic calculations on fields, records and entire databases with a few keystrokes, with accuracy to 10 places.

Change your data or your entire database structure without re-entering all your data.

And after you're finished, you can protect all that elegant code with our run-time compiler.

Expand your clientbase with dBASE II.

With dBASE II, you'll write programs a lot faster and a lot more efficiently. You'll be able to write more programs for more clients. Even take on the smaller jobs that were out of the economic question before. Those nice little foot-in-the-database assignments that grow into bigger and better bottom lines.

Your competitors know of this offer.

The price of dBASE II is $700 but you can try it free for 30 days.

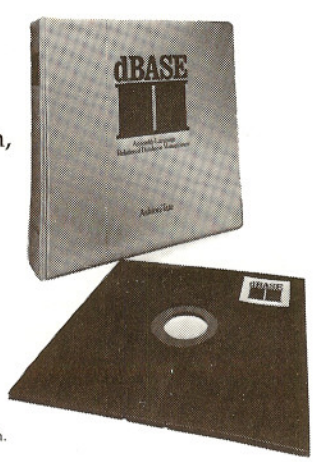
Call for our Dealer Plan and OEM run-time package prices, then take us up on our money-back guarantee. Send us your check and we'll send you a copy of dBASE II that you can exercise on your CP/M® system any way you want for 30 days.

Then send dBASE II back and we'll return all of your money, no questions asked.

During that 30 days, you can find out exactly how much dBASE II can save you, and how much more it lets you do.

But it's only fair to warn you: business programmers don't go back to BASIC's.

Ashton-Tate, 9929 Jefferson, Culver City, CA 90230. (213) 204-5570.



Ashton-Tate

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Volume Two, Number Six

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Richard Kaye
Editor and Publisher

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Dynacomp, El Toro, CA

Printing
Shears Litho, Santa Ana, CA

input...

Editor:

I forgot to indicate in my 1982 General Survey response an idea for a "back to basics" column. This type of item was carried for many years by **Flying**, and periodically repeated fundamental information which everyone needs but may forget. More specifically, I had recently purchased a 16FDC board and some new disks. I had forgotten how to initialize them, and by the time I finally succeeded, I wish that I had written a detailed article of the procedure. As I recall, the first step required modification of the Cromemco master so that it was double sided, double density. This required covering the write protect hole and running ATTribute. Then I had to (I think) INIT the new disk, but that only yielded 256K capacity. Next I ran STAT and finally CDOSGEN, and at last the disk capacity increased to 1.2 Megabytes. The frustrating part of all this is that the Cromemco manual (at least the one that I have does not list in plain, simple English the steps in numerical order that one must follow to initialize a disk. I realize that there are detailed sections on INIT, STAT, and CDOSGEN, but I wanted to use the disk the same day, not next week. So hopefully, you get the idea of what I'm suggesting. The less proficient user could greatly benefit from periodic, simple explanations of required procedures.

Another idea I would like to see you pursue is a periodic listing of Cromemco dealers (since they seem to come and go with the seasons) and also an announcement whenever a new Cromemco catalog is released.

Keep up the good work!

Sincerely yours,
Thomas H. Townsend, Member #00153
40 Lunt Drive
Greenfield, MA 01301

Editor:

Just a note to let you know that I have rewritten my Comet-FORTH language system and it now runs under CP/M, CDOS and CROMIX with no modifications. It uses a screen file which can be manipulated by the operating system just like any other file. It is the fastest 8-bit microcomputer FORTH of which I am aware. For example, it will load and compile a typical 34K source program in 13 seconds. The price of the software package including floppy disk and manual is $50.00. A version to run on the new Cromemco DPU using the 68000 microprocessor will be available soon.

I have very much enjoyed I/O News. Not only does it keep users abreast of the latest Cromemco products, but it contains the best Cromemco user information I have found anywhere. Keep up the really good work!

Very truly yours,
W.F. Haygood, Jr., Member #00076
Computer Methods
7822 Oakledge Road
Salt Lake City, Utah 84121
(801) 942-8000

Editor:

Has anybody out there had any pin problems that can be attributed to TARNISH? Raise your hands. I've had my share of problems because of it and a closer look may prove that you are having yours, too.

Silver is a nice metal, as metals go, and it has some very interesting properties. It is a good conductor of electricity and solder adheres well to it. Therefore, I understand the method to the madness, but since tarnishing is also an interesting property of silver, using silver pins on chips is madness indeed.

If you have a flaky system, or more specifically, board, and have as yet to figure out what's going wrong, then take a good hard look at the pins on the chips. Most of the chips in question come from Texas Instruments—but pull each chip to see if cleaning is required. If any of the pins are brown, black, or darker than the chip itself, then your board has a bad case of the 'grungies.'

My solution to this problem is Tarn-X. Heaven forbid that I push one product, since I'm sure that any silver cleaner (i.e. tarnish remover) will do the job—this just happens to be the one that I grabbed.

Merely remove the dirty chip (work with one at a time), dunk it until it comes clean, and rinse in running water. Dry off the water spots, blow off any remaining water with compressed air and plug it back into the socket.

You can modify the above procedure to suit your mood, but, while you're at it, pull and plug all the non-plated chips to make sure that those connections are good. One other thing you may check for are chips with defective pins. You will usually find these when you are giving the chip it's bath.

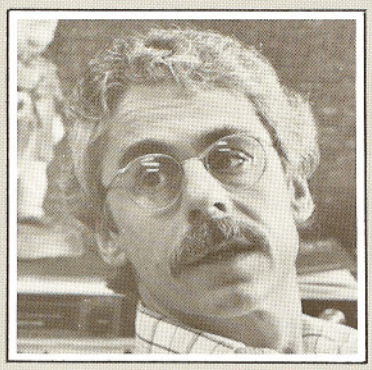
Problems caused by tarnish are so common that I wonder why no one has mentioned this fix before. As a computer dealer with a service center, I can use the business as much as the next guy—so maybe it has been the income from unnecessary repairs that has made this such a well kept secret.

Kim I. Dildine, Member #00051
KID Enterprises
Hammond, IN 46324

Meet Kathleen...
Kathleen Heckman, that is. She's our new Assistant Editor (see photo). Kathy has been with us since July and has been responsible for a number of improvements in the massive flow of paper that goes through this little office. In addition to her skills at office organization, she is a talented writer and has contributed to several articles in the past two issues. In her spare time, Kathy is completing the requirements for a degree in communications at California State University at Fullerton, and is learning to use a microcomputer (a System 1H, what else?).

Kathleen T. Heckman

output



Trade Shows...
are great places to discover new products, trends, and a lot of rumors, and MINI/MICRO '82, held in conjunction with WESCON, was no exception. We spent a few days in Cromemco's booth at the show, held in September at the Disneyland Hotel Convention Center in Anaheim, California, where we saw several things that bear mention. (We'll dispense with the rumors simply by ignoring them.)

Some new products are covered elsewhere in this issue (see: Computers Given Window to the World). Others, like the System 3A, will probably be discussed more fully in subsequent issues, but let us give you our first impressions now.

The 3A is a newly engineered System Three sporting a redesigned front panel, a Tandon Thinline 8" drive, a five-inch hard disk (HD-5 — see Vol. II, No. 3) occupying the space formerly assigned to C & D drives, improved air flow, and a drawbridge for internal cabling.

The original System Three was designed when? About 1977? The System 3A incorporates a significant number of technological advancements that didn't exist in 1977, and makes it on a par with the System One (in my vociferous opinion, the best engineered microcomputer in the world).

Networking and Distributed Processing were terms bandied about with abandon at MINI/MICRO '82, much of the noise made by companies I'd never heard of before (and some which we may never hear of again). For my part, I'm anxiously awaiting a report from the R&D labs at Cromemco which were wired (cabled) for C-NET several months ago. The rationale embodied in C-NET (so eloquently described in David Mandelkern's article in Vol. II, No. 3) represents a broader application than any of the approaches seen at the show. That means C-NET should offer greater applicability to a wider range of business installations than other devices being offered.

"Cro'sNEST" Introduced
Robert Kuhman of Sunnyvale, California just announced a remote 'dial-up' service for IACU members featuring programs, utilities, and routines written by Kuhman and other members. One of the first contributors was Jim Gunkel of Beavercreek, Ohio who has authored a couple of articles for I/O News. Some of the programs Gunkel has made available are: 'bitmap', 'repgen', 'Z2D bios for CP/M', and soon, 'H19 Drivers'.

The file transfer protocol is based on XMODEM, Version 5.2, with communications based on a Potomoc Micro Magic PMMI-103 allowing callers to use baud rates between 110 and 710. Local calls can transfer data at 710 baud, while remote callers are cautioned to remain at 600 baud, or less.

Kuhman advises that he has plenty of space available at his end to receive your contributions—necessary ingredients for this entire venture to work to the advantage of all interested users.

In order to contact the "Cro'sNEST," dial (408) 732-2433 for the dedicated modem line. Long distance callers may access the system via normal phone lines, MCI, SPRINT, or ITT. In the event the phone just rings and rings when you call it is because Kuhman is doing some work on the system. Or, as he puts it, "...making the 'Cro'sNEST' a great place for Cromemco-phreaks everywhere."

The emphasis is on software developed for Cromemco systems, and on CP/M software known to execute under CDOS.

Please be advised that any original software donated to the pool becomes a part of the public domain.

Thanks Bob, a great service.

Just a Note
We've received quite a few responses regarding Leo Greenberg's article, **Expert System in Occupational Safety and Health Engineering** (Volume Two, Number Five). If you wish to pursue this subject further, Dr. Greenberg can be reached at: 36 Katzin St., Raanana 43000, Israel. Phone: 052-28335.

Richard Kaye
Editor

Affordable Hard Disk Storage!

Dravac Ltd. is pleased to announce that its line of add-on hard disk sub-systems, the DR-400, is now available for Cromix users. The DR-400 is truly a Cromix device. Add it to any existing Cromemco installation, including all-floppy configurations such as a System One. You can even use it side by side with your Cromemco hard disk drives!

Use the DR-400 as a root device, or as a mounted device. To Cromix, it's just another disk—only bigger and faster! Programs running under Cromix can't tell the difference between the DR-400 and a Cromemco drive. This means existing software will run without modification.

Individual files may be as large as the physical size of the drive: 30, 60, or 140 megabytes. There are no arbitrary file size limits as with some "add-on" disk drives.

Consider these features of the DR-400:

- We use the proven PRIAM 14" winchester disk drive as the basis of our subsystem. We supply 30, 60, and 140 megabyte models (formatted capacity)—thousands of which are in the field.
- We supply a completely compatible Cromix software interface including disk driver, system generation utility, formatter, and additional utilities. Installs in minutes on any Cromix system.
- Controller handles up to four drives. 30, 60, and 140 megabyte units may be mixed on the same controller.
- Media defects are automatically handled by the disk drive without intervention of the host processor.
- Drive employs a linear voice coil positioner for fast access.
- The subsystem includes everything that you need for immediate installation under Cromix. Typical installation times are 30 minutes!
- Immediate availability.

Dravac has installed hundreds of these subsystems on other computers. Our field service record has been fantastic. Now Cromix users can enjoy the benefits of fast, inexpensive, hard disk storage.

For further information, contact your Cromemco dealer or Dravac Ltd. directly.

hardware by dravac

Dravac Ltd
53 Deerhaven Road
Mahwah, NJ 07430
(201) 825-1616

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Will take best offer over $4,500.00

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All cables
Will take best offer over $7,500.00

PROFESSIONAL DATA SYSTEMS, INC.
(602) 265-6656

Continued from front page

New 256K Card Lowers the Cost of Memory

256KZ cards are reqired with IC39 replaced by a Cromemco 74948 in one of the cards and by a 74949 in the other, for proper bank addressing.

A remarkable feature of the 256KZ is that it **automatically** switches from contiguous memory when used with 68000 CROMIX in DPU-based systems to bank selected memory in Z-80 CROMIX systems. The switch settings on the board determine its address range in 68000 memory space. The PROM plugged into the IC39 socket determines the memory banks selected in Z-80 systems. This means that with Cromemco's dual processor D-series systems you can actually use either Z-80 CROMIX or 68000 CROMIX interchangeably without changing any settings on the 256 KZ memory cards used in the system.

The 256KZ can be byte-addressed or word-addressed. During Z-80 memory operations eight bits of data are transferred at one time, while with 68000 memory operations, 16 bits of data are transferred at one time. In this way, there is no speed degradation when using the 256KZ with 68000 systems.

The 256KZ should prove to be a cool, reliable board in operation. Even though it has four times the memory of a Cromemco 64KZ card, the power consumption of the 256KZ is about the same as that of the 64KZ.

The list price of the 256KZ is just $1295. Cromemco is now also offering their popular D-series System One computer with the 256KZ. The dual floppy version of the System One with the 68000/Z-80 DPU and 256K of memory (Model CS1-D2) lists for just $4995. The hard-disk version of the System One with DPU and 256KZ (Model CS1H-D2) lists for just $7995.

So whether you are looking to add more memory to your Z-80 system, or are looking to move up to the 68000, the 256KZ may be the memory card for you. CD

Continued from front page

A Brief Overview of Two Vital Acronyms: CAD (Computer-Aided Design) and CAM (Computer-Aided Manufacturing)

sponds to linguistic data. Computer graphics effectively approach the way the brain was designed to work.

CAD/CAM has the potential to increase productivity more than any other development since electricity. For example, a CAD/CAM designer can now define a part's shape, analyze stress applied to it, and automatically produce engineering drawings for that design. The trend is toward a multidisciplinary approach in which serveral designers can take part through nearly all phases of design or analysis.

In an ideal CAD/CAM setting, people in the factory should be able to tap the common pool of data. Production planners and schedulers, accountants, and shop-floor foremen, among others, should all be able to plug easily into that store of manufacturing wisdom. The creation of such a common data base is the backbone of any system of computer-integrated manufacturing. The concept being shared files for shared knowledge.

Cromemco's C-NET, a new local area network, is an ideal way to implement full CAD/CAM. By using a physical link similar to military standard 1553B, a highly rugged network was created for just such jobs.

CAM, the other side of CAD/CAM, refers to something that has come to be commonplace in manufacturing plants—computer control of production machines. Cromemco's I/O boards, 4PI/O, 8PI/O, D+7AI/O, 12-BIT ANALOG I/O and the GPIB (IEEE 488 interface) connect your computer to the production machines of today and of the future.

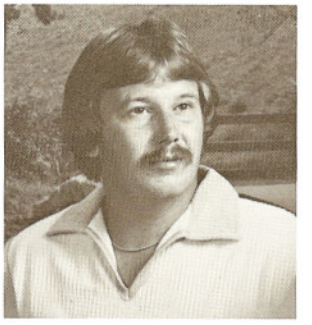
To venture into CAD/CAM you first need to read and understand about graphics. The book, **Graphic Software for Micros** (1), written in basic for the Apple, is easy to convert to run on a SDI or TRI-SD1 system. Cromemco's SDI Basic software can either be converted to recognize the Apple commands or as the programs are input they can be converted to Cromemco's command format. The programs you'll find most interesting are 2-Dimensional Interactive Graphics, 2-Dimensional and 3-Dimensional Rotation, Hidden Line Removal and 3-Dimensional Shapes. Three other books, **Data Plotting Software, Engineering Software,** and **Structured Analysis** (1) — are also very helpful. The best way to keep up with CAD/CAM software and hardware is to subscribe to Computer Graphics World (2). Each issue is packed with helpful information. CAM-I, Computer Aided Manufacturing-International (3), a nonprofit company, can also help you ease into the world of CAD/CAM.

Continued on next page

(1) Kern Publications
190 Duck Hill Road
Duxbury, MA 02332
617-934-0445

(2) Computer Graphics World
P.O. Box 122
Tulsa, OK 74101
800-331-5959 or 918-835-3161

(3) Computer Aided Manufacturing-International
611 Ryan Plaza Drive
Suite 1107
Arlington, TX 76011
817-860-1654



About the Author

Jerrell M. Johnson is president of Logistic Concepts, Inc., computer consultants based in Lewisville, Texas, a Dallas suburb. The firm has experience in both business and technical hardware installations, with software customized to complement the applications. Johnson spends his spare time teaching about computing at The Little Old Electronic Schoolhouse, home of a Dallas-area users' group and computer school.

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  - — Payroll
  - — General Ledger
  - — Cost Analysis by Cost Center
- TRI·STAR Features:
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  - — Interaction between A/P, A/R, P/R, & Cost Analysis
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Continued from Front Page

An Associative Data Base

pointment cancellation, I found myself with some time on my hands. Being a hard worker and not inclined to goof-off, I decided to apply my nose to the grindstone and visit the friendly local computer store. After all, it is part of my job to keep up with all the neat new goodies in the field. After fondling all the equipment and driving everybody nuts with questions, I decided it was time to check out the book racks for any choice finds. As I looked through the rack I couldn't believe my eyes. There sat Volume IV of Dr. Dobb's Journal of Computer Calisthenics & Orthodontia. Well, this was one tax deduction I wasn't about to pass up.

As I read through the index I spotted an article written by Mr. Klaus Holtz. The title read "Build a Self-Learning Computer with Your Microprocessor." Mr. Holtz described a machine which stored questions and answers linked by an array associating them one to the other. Basically, if you asked a question and then supplied an answer, the next time the question was asked the answer would be supplied automatically. Another interesting feature was, as the data base increased in size, the additional storage required for new information would be less. That is to say the more information stored the less room it takes to store additional information.

Well, this theoretical machine really sounded interesting. Since it was the weekend, the only computer available without a long drive to the office was my HP-85. I keep it in my work room ("the pit") at home. The program came up with very little trouble. However, there were a few things which I had not anticipated. The HP-85 was much too slow for this type of application, the memory conservation routine was wasting memory, and I wanted to change the operation slightly so that the associations were automatically bidirectional. As an example, suppose you were working with your checking account. If you typed in a check number it should supply all the information about that check. On the other hand, if you typed in a name all check numbers written to that name should be supplied. For that matter, if you typed in an amount all check numbers written for that amount should be supplied. At this point I decided to make a few notes and pack it in until Monday when I would continue to work on my Cromemco System-3.

After the program was de-bugged on the System-3 and updated with revisions, I decided to test it with some names and addresses. In order to evaluate the memory consumed by the incoming information, I had the program routinely print out its pointer value, which was equal to the size of the data base in bytes. As I started inputting the names and addresses it didn't take long to see that the program was working very well and speed was no longer a problem. The first thing I noticed was that the city, state and zip data were not taking up any new room if they had been previously entered. If I typed in a name already stored, it responded with all the information stored under that name. A zip code almost magically produced a list of all the people living in that zip area. This was exciting but in all fairness, I must confess that my next thought really got the old heart pumping. What if I now entered another data base on top of my name and address data? Well, it worked just great. In fact, I have one data base which stores information on names and addresses, satellite data (names, dates, and destinations), checking account information, and some physical properties of the elements. Now that's what I call eclectic. The data are all in there together and they haven't interfered with each other—except on one occasion when I typed in a check amount and got back the check information, as advertised, along with everything I always wanted to know about the ionization potential of hydrogen, at no extra charge or obligation. No big deal, after making all the field descriptions non-ambiguous, everything (except my sense of humor) worked just fine.

After playing with the program enough to overcome the "new toy syndrome" I decided it was time for a more objective evaluation. Clearly, the association scheme worked well and I'm sure there are many applications to which it would be well suited. But, I have mixed emotions about the memory conservation technique. If the information you wish to work with is highly redundant then this scheme will work with a relatively small amount of storage compared to the data base. However, in order to save memory it must find more than the first 66% of the input string already in memory. Therefore, if the information being stored is highly generalized and random in nature, it would require a large amount of storage before an average redundancy rate of 66% could be expected. This doesn't mean that the routine is useless. On the contrary, I think it is very useful in certain applications as I discovered with my sample data base. I suspect there may be a better method but I have not yet found it. As address paths widen and memory becomes less expensive this routine might be just fine as is. In any case Mr. Holtz deserves a hand for having the forethought to realize that the issues of general purpose association techniques and memory conservation are important and I commend him on his approach.

My program currently has the ability to store and retrieve its data from disk. One limitation is that all the data must be in memory while the program is using it. I leave it to

Continued on next page

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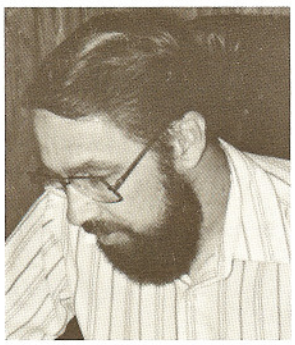
An Associative Data Base

one of you out there to write the random disk routines. If a standard file format were to evolve for this program one could exchange disks with a friend and, "Eureka" both systems would increase their data without a corresponding increase in file size. Who knows, one day I may want to store the history of the world on a floppy and write the drivers myself. But, for now, I'm content with the program as it is. Those of you who are pioneer types will find sufficient data in a subsequent article to roll your own. On the other hand, a working copy of my test program (.FOR & .COM) is available on single density (specify 5 in. or 8 in.) disk for $25.00 (Calif. residents please add 6.5% sales tax) from:

MILLER & ASSOCIATES
1960 California St. #17
Mountain View, CA 94040

Those of you outside the continental United States please add $5.00 for postage. Thanks.

Well, that's all for this time. Oh, by the way, Mr. Holz makes reference to a patent of some sort on his machine so if you want to do anything commercial with it you'd better check with him first.



About the Author

Mr. Miller is founder of Miller and Associates, a High Tech Consulting firm in the Silicon Valley.

Prior to this, he established the Computer Terminal, a computer store located in Mountain View, and was involved in the organization of the Western Computer Dealers Association.

Miller moved to Mountain View from Nevada, where he was Director of Research at the Nevada Research Institute.

Cromemco Introduces Eight New Boards at WESCON

Computers Given Windows to the World

Not content to make WESCON - MINI/MICRO '82 a repeat of previous displays, Cromemco took the lead when it introduced eight new S-100 boards at the Anaheim, California show (held in September). Each of the new boards is an individual success, making it extremely difficult to pinpoint one as being of the most importance to the greatest number of users.

Certainly the 64KZ-II is a vast improvement over the older RAM cards. The chip count is reduced from 78 to about 57 using modern LSI technology. Also, the Heat Sink is much smaller, and the leads are wave soldered. We have been using this board at IACU for the past few months and can report absolutely no problems. It has the coolest operation of any RAM card of which we are aware.

Other boards introduced have more specific applications. An example is the CSP, a High Speed Serial/Parallel Interface for many peripherals, including tape backup devices. Also new and useful is the CPIB IEEE-488 Interface Controller, which is an instrumentation bus. Good news for scientists and lab techs.

The CTI (Cromemco Terminal Interface) card heralds the arrival of the C-1 Terminal by providing input to the keyboard and video signal output for 80-character by 25-line display.

And, if higher precision in analog conversion is important to you, it can be achieved with one, or both, of a new board set. The ADC-12 is a 12-bit Analog-to-Digital Converter, while the DAC-12 is a 12-bit Digital-to-Analog Converter. They've got us coming and going! (Don't worry. The reliable old 8-bit D+7A is still available).

Networking was not ignored in the new board display. The CNI (C-Net Interface) card attracted a lot of interest. This card, designed to be used with the IOP card for network installations, is a vital link in a burgeoning market.

Like the little kid who opens the biggest present last, we reserved this spot for the SDD. It's extremely exciting because it puts windows in our micros. It actually gives our computer memories direct access to the outside world. The SDD's official nomenclature is: Color Digitizer Interface. Dull sounding when you realize that this humble little S-100 card allows a TV camera to look at an object (a letter, a number, or a panorama of the Canadian Rockies) and put the image directly into memory. No more time-consuming programming, color-by-color; no more tedious "painting" and "erasing" on the bit pad—the SDD gives us the world in living color.

The implications of entering information via camera into a computer's memory are far reaching. From the labor and time that can be saved by using this technique in data entry, one's imagination can soar to the creative aspects. No longer, in advertising agencies around the world, can art directors throw up their arms and say: "Hold it, J.B., I'm just too swamped with work to learn programming." The SDD just brought it all home. Coming from an advertising agency background myself, I cannot help but wonder at the immense graphics applications opened by the SDD to those who were once afraid of computers.

We truly do live in a wondrous age. (A complete listing of the new boards, with suggested retail prices, is included below. Please note that not all are immediately available.)

	PRICE
64KZ-II 64K RAM CARD	$695
CSP High Speed Serial Parallel Interface	$595
CTI Cromemco Terminal Interface	$395
GPIB IEEE-488 Interface Controller	$595
ADC-12 12 Bit Analog to Digital Converter	$395
DAC-1212 Bit Digital to Analog Converter	$395
CNI C-Net Interface	$395
SDD Color Digitizer Interface	$995

For — Next Statement in Variable Steps

by Zhang Xiao-dong

When we do not know at the time of writing the program how many repetitions will be necessary, the Repeat statement, as is provided in PASCAL, is used. The general form of the Repeat statement is:

Repeat
    Statement(s)
Until condition

We can also use the While statement, as provided in PASCAL or ALGOL, for the problem:

While condition Do
  statement(s)

Both of the statements have two parts: the loop and the termination condition.

But, there are not Repeat and While statements in 16K Extended BASIC (the Repeat and While loops do exist in 32K Structured BASIC). These constructs can, with a few additional statements, be implemented by using the 16K BASIC For/Next statement. The general form is:

```
10  For I=0 to 1
20  Loop entity
30  I=0 (condition not satisfied)
40  Goto 60
50  I=1 (condition satisfied)
60  Next I
```

The For/Next statement is a Variable Stepped loop: the loop index, I, is incremented by one each time the "Next I" statement is executed. The statements within the loop are executed until the loop variable exceeds it's specified limit. In the example above, the statements between the "For" (line 10), and the "Next" (line 100) will be executed until the loop variable, I, is GREATER than 1.

Within the loop entity some condition is tested: if the condition is NOT met, the loop index is set equal to 0, and a branch is made to line 60. Here, the loop variable is incremented by one (I=0+1=1); the Next statement causes a branch to line 10, where the value of the loop variable is tested. Since I=1, and is within the bounds of the loop, the loop entity statements are executed again.

Had the condition within the loop entity been satisfied, the loop variable, I, would have been assigned the value of 1. When the "Next I" statement (line 60) was executed, it would be incremented to 2. The test in line 10 would fail, and the program would branch out of the loop to the statement after line 60.

This For/Next construct results in a series of statements being executed, and re-executed, until the proper condition is met: this being the function of both the Repeat and While statements.

A simpler example program, which has been run on a Cromemco microcomputer, is as follows:

```
 10  Rem Implementation of Repeat/While loop
 20  Rem using the For/Next statement.
 30  For I=0 to 1          :  Rem — if I>1 then exit loop
 40  Print "4 + 5 = ?"     :  Rem — Ask for solution
 50  Input X               :  Rem — Get user's answer
 60  If X = 9 then 90      :  Rem — if correct, goto 90
 70  I=0                   :  Rem — wrong answer
 80  Goto 100              :  Rem — repeat loop
 90  I=1                   :  Rem — will exit loop
100  Next I                :  Rem — increment I, goto 30
110  Print "You are right." :  Rem — I>1
120  End
```

The program asks for the solution of "4 + 5 = ?"; it stores the users response in the variable "X". If the correct answer is given (X=9) then line 60 is executed, causing a branch to line 90. Here, the loop variable is assigned the value of 1. In the next statement (Next I), it is incremented by one, yielding the value of 2. The loop index is then tested in line 30, exceeds the bounds (is greater than 1), exits the loop entity (jumps to line 110), and displays "You are right."

Had an incorrect answer been given (X not equal to 9), then line 60 would NOT be executed. The following statement (line 70) sets the loop variable equal to 0, and then branches to line 100. Here, the loop variable is incremented by one (I=1), and tested in line 20. Since the loop variable is within bounds (I=1), the statements within the loop entity are executed again. The program will continue to ask for the solution of "4 + 5 = ?" until the correct answer is given.

(Editor's note: Our thanks to Bill Jaenicke for his technical editing.)

About the Author

Zhang Xiao-dong is a teacher in the Computer Science Department of Beijing Polytechnic University, People Republic of China.

Breakthrough in Robotics

The computer revolution is unique in our experience in that reality is approaching fantasy. The promise of computers is being fulfilled—in offices where basements of files are now contained on five inch disks, in homes where checkbooks are (hopefully) balanced without pen and paper, and even in supermarkets where optical scanners read the prices of our groceries. In a generation, we have progressed from pre TV to an amazing present where one can purchase everything from clothes to stocks from a comfy chair at home.

But what has happened to the initial vision of the computer as the key to man's release from physical toil—the services that have to be done but that can be repititious and, in some instances, dangerous? What has happened to the **Robot?**

Up until the present, there have been factors which have contributed to the limited use of robots. One factor has been a lack of versatility. Traditionally, a robot is designed to perform a task—the same task x-times a day, day-in and day-out, year-after-year. This can be a benefit in large industries, but hinders the smaller business where there is greater variation in chores.

The second limitation is cost. More than 20% of the industrial robots in use today are in Japan. Surprised? Don't be. Robots have been very expensive. It was only through the medium of a government financed leasing company that Japanese industrialists were able to introduce robots into their 'labor pool.' And it was only due to the savings (up to 20% of wages per year) of the existing labor force that the funds were available for the Japanese government to form such a leasing company.

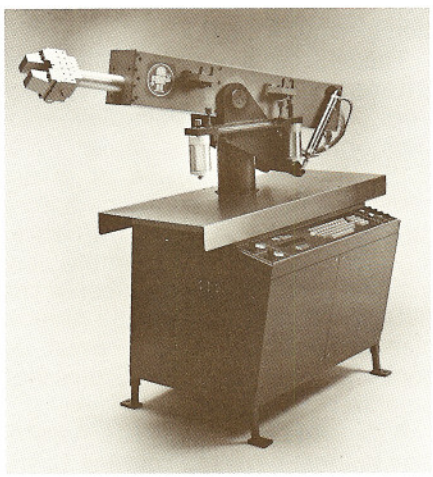
Domestically, I have seen robots before—mostly at trade shows, and they have been very talented. They can "talk" and "see" and "hear" and they entertain crowds with great gusto. They are wonderful in every way except for their cost—typically upwards of $100,000.

The robot I saw recently demonstrated while attending a training seminar at Cromemco was much duller by comparison. However, it promises to bring us a step closer to the R2-D2s of our imagination.

Called the XR-2, it is designed to sell for less than $25,000 and, just as important, it is easily programmed to change tasks. The story behind the XR-2's development is intriguing.

Jeff Page, the owner of a machine shop in Menlo Park, California, had a contract to build an industrial robot for a machine tool distributing company. Versatility was mandatory as the finished product would be used in tool and die shops as a "pick and place" robot. It's primary function would be to pick up an object and put it down in another place. In order to do this it would have to communicate with the outside world.

The robot specifically would be required to take a piece of unmachined metal, give it to another machine for some particular processing and then, on the second machine's command, retrieve the finished piece and put it somewhere else. Because machine shops typically have limited production runs, it would have to be programable to practice put-and-place techniques with many different sized and shaped objects, and to interface with several different types of processing machines.



XR-2, a put-and-place Robot utilizing Cromemco "brains." The keyboard, readout, and some of the pneumatic valve system are identifiable. The "hand" and "arm" are capable of a broad range of movements.

Page had no difficulty in designing XR-2. The problem came with the task of designing a computer which would both control the robot, and allow a machinist to easily change the program to perform its myriad duties. At that point, it was like the Scarecrow in The Wizard of Oz before intelligence had been granted.

Luckily, Page found Trone Miller, a well-known computer consultant in nearby San Carlos. Having an excellent working knowledge of Cromemco's boards, Miller accepted the challenge with simple understatement. "We have computing power here," he reasoned, "let's put it to use."

Miller's task was complicated. Since the majority of existing robots performed completely repetitive tasks, they were programmed by compiler. However, this would not suffice for the prescribed functions of the soon-to-be XR-2.

The first step was to find or, as was the case, write an interpretor that contained simple, yet versatile commands. The parameters were that it had to fit within 8K of memory—and that the first strike version had to be up and running within three months.

Writing the first strike instruction sets in Assembler would have fit, space-wise, but would have taken too long. Miller, with many years experience writing in FORTRAN, took an approach that may seem the long way around, but produced a language that is eloquent due to it's simplicity.

First, he designed and flowcharted all the modules to determine how much could actually be said in only 8K of memory. Then, because he could use the structured programming approach, he wrote it in RATFOR, pre-processed it into FORTRAN, linked it (via the LINKING loader) with the FORTRAN Library, and saved it on disk as a .COM file. At that point, it was burned into PROMS for XR-2. Miller calls his newly created language BRIL*, an acronym for BASIC ROBOT INSTRUCTION LANGUAGE.

To fully understand the workings of BRIL, it is necessary to examine

Continued on next page

Continued from page 13

the makeup of XR-2's internal computer. Miller started with Cromemco's small card cage (8-slot), an SCC CPU card (8K PROM), a 4KZ memory (RAM) card, and an eight parallel port I/O board which Miller designed himself. This combination allows for keyboard input in BRIL (ASCII keyboard built-in), display output (also built-in), the ability to receive and save programs from external sources (teletype or another computer), the capacity to communicate with external sources (teletype or another computer), the capacity to communicate with external numerical control devices (milling tables, lathes, etc.), and control over the pneumatic valving which dictate XR-2's movements.

Notably apparent is the limitation of only 8K of instruction set memory. Therefore, Miller structured BRIL so that it is composed of two "Command Sets" which are programmed into the robot when it is sold. The Command Sets are more like a language in kit form—the first such language ever developed for the field of robotics.

Actually, these instruction sets should be thought of as the Internal Command Set, and the External Command Set, or "Action Set." The Internal Command Set allows for the writing, editing and executing of Command Set programs. The External, Action Set, can be modified by any licensed end user, and contains the actual performance programs (e.g. arm extend, arm lift, arm retract, etc.). While the Action Set can be modified by the end user, the source code for BRIL (the Internal Set) remains with Miller. Source code for the Action Set can be proprietory to the end user.

While the XR-2 itself is a finished product, the future of BRIL remains to be seen. What Miller created may be the most important breakthrough in the advancement of robotics yet seen in this country. The main problem is that too few "movers and shakers" have heard of BRIL.

Until now, that is.

(* BRIL is a registered trademark of Miller & Associates, San Carlos, Ca.)

How To Recover Erased Disk Files

by Jo Ann Drake

A common problem of programmers seems to be the erasing, by mistake, of wanted disk files. We just never seem to back-up a disk at the right time. Having to re-enter a source file from a recent .PRN file is surely better than reconstituting from scratch, but, at best, very frustrating and time-consuming.

Finding an article, "How To Recover Erased CP/M Files," by Gene Cotton in the December, 1981 issue of "Interface Age" magazine, seemed almost like striking gold. Knowing that CP/M and CDOS operating systems are compatible in many respects, there was little to lose, except time, and the great possibility of much to gain in entering the program. Being aware that CDOS 2.17 can read the directory of CP/M 2.2, and vice versa, there was hope of success, as the 'UNERA' program was said to run without modification on any CP/M 2.2.

The source code as published was entered using Cromemco Text Editor Vers. 00.10, and assembled with Cromemco Macro Assembler Vers. 2.15. What a multitude of errors came forth! Fortunately, before junking the entire effort, (my working knowledge of Assembly language is minimal), I remembered the 'TRANSLAT.COM' file on the Assembler disk. That .COM file must be good for something or Cromemco wouldn't have included it.

A few minutes with the Assembler manual gave the courage to try yet another new path. Hope springs eternal, 'tis said. After running the original source file with the TRANSLAT program, out came the much more familiar Z80 code. (The original code had looked strange to even my unpracticed eye.) There were a few errors to correct, as usual, but with a little effort, a 'NO ERROR' Assembly was produced, and a .COM file created.

Selecting a well-backed up disk, testing began. What a thrill to see an 'ERA'D' file re-appear in the Directory! The only disappointment was there being no one around to share the joy. Several had been present tc hear the screams of agony a month before when a 26K source file was 'ERA'D'.

A few words of caution: NEVER, I repeat, NEVER write to the affected disk before you attempt to recover lost files! Do not attempt to XFER the UNERA.COM file to the affected disk. Any change to the Directory may make it impossible to recover any files!

Secondly, there can be no guarantee that the recovered file will be the desired latest version, especially if the file covers more than one extant. Double-check the recovered file before using it. Consider its contents 'under a cloud' until you have verified it completely.

Regarding the source code submitted herein, no change has been made to the comments or remarks. All were part of the program as published. It has been left to the more knowledgeable user to make these terms more meaningful for Cromemco software. During execution, the sign-on message, 'FOR CP/M 1.4' appears; however, no changes were made to the original 'SECTRAN.' It is as published. The original magazine article is interesting and educational, and I recommend reading it if a copy can be found.

Continued on next page

To create the .COM file:
ENTER THE SOURCE FILE WITH ANY EDITOR.
MY FILE IS NAMED— UNERA.Z80
Then:
A.ASMB UNERA
A.LINK UNERA/E
A.SAVE UNERA.COM 4

To recover an erased file:
A.UNERA (DISK DESIG):(FILENAME).(EXT) <CR>

Caution: Do not XFER the .COM file to the disk containing recoverable files. Disks may be changed, logging in one containing the UNERA.COM file by the usual 'CONTROL-C.' The users' own testing will establish a pattern for usage. My testing has been confined to CDOS versions 2.17 and 2.36.

Good luck! And back-up that disk after you recover the file. Maybe you will never need 'UNERA' again.

(Editor's Note: Jo Ann Drake supplied us with a complete program listing, after it was run through assembler. If you would like a copy, merely write: 'UNERA' c/o I/O News. We will send it to you free of charge.)

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Mark Twain

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We think Mark Twain would be pleased.

IFDAS, an Interactive Forecasting and Data Analysis System, uses Cromemco 32K Structured Basic under the CDOS or CROMIX(trademarks of Cromemco) operating systems. IFDAS occupies over 400K of disk storage. The complete system is $595. Manual alone is $30.

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Cromemco to Offer High Level COBOL Compiler

Cromemco is the first manufacturer to announce a High Level COBOL compiler on a microcomputer. Under a recent OEM agreement with Micro Focus, Cromemco microcomputers using Micro Focus' Level II COBOL will run any ANSI '74 standard COBOL application. Now even standard COBOL applications on the largest mainframe computers will become accessible to microcomputer users.

According to Dr. Harry Garland, Cromemco's president, "We wanted to complement the most powerful microprocessor, the 68000, with the most powerful software. The Micro Focus High Level compiler is the most powerful COBOL available for microprocessor-based systems. Before, such a powerful language had only been available on mainframes."

Cromemco will offer Level II COBOL with its dual processor 68000/Z-80A based System One, System Two and System Three microcomputers, which run under Cromemco's CROMIX operating system.

Micro Focus will interface the High Level compiler to the CROMIX operating system and deliver a turnkey product. The product will also include record locking features for use in a multi-user environment, according to Paul O'Grady, Micro Focus president.

O'Grady said "There is an estimated $100 billion worth of COBOL application software worldwide, and much of it conforms to the ANSI '74 standard. Our strategy has been to develop a highly portable compiler and to achieve High Level certification to bring these COBOL applications from larger systems to microcomputers."

Micro Focus Level II COBOL Certified by Federal Compiler Testing Center

Level II COBOL is the only microcomputer COBOL certified at the High Level by the Federal Compiler Testing Center of the U.S. government General Services Administration (GSA). The GSA certified the compiler as having zero errors after using their standard tests which contain more than 225,000 lines of COBOL and 5,500 individual tests designed to break COBOL compilers.

Micro Focus, who developed the compiler, previously produced ANSI '74 standard CIS COBOL, the first COBOL compiler certified on a microcomputer by the United States government.

Cromemco Opens U.S. Branch Offices

Cromemco has opened the first two of several planned domestic branch offices as part of a continuing effort to bring the West Coast-headquartered company 'closer' to users across the U.S.

Designed to provide dealers and distributors with technical and sales support, these regional offices are staffed with direct factory representatives. Operating primarily as service centers for dealers, the new offices will also greatly benefit the end user by allowing dealers to get quick, direct corporate responses to their customers' questions and problems.

The first office, opened earlier this year, is located at 50 Mall Road, Suite 201, Burlington, MA 01803. Officially sanctioned the Eastern Regional Office (read 'the Boston Office'), it is staffed by George Brandt, Regional Sales Manager, and Jerry Adams, Regional Support Engineer. They can be reached at (617) 229-2680.

The 'Boston Office' served as a prototype and it's success paved the way for the second branch, which recently opened in Atlanta.

Headed by Len Rothman, Southeast District Sales Manager, the Atlanta office will also be staffed by a support engineer, yet to be named. In the interim, Rothman's background in electronic engineering and computer marketing has enabled him to single-handedly man the store until the final appointment can be made.

Those interested in contacting the Atlanta office can do so by calling (404) 391-9433; the branch is located at 1150 Hammond Drive, Suite D, Atlanta, GA 30321.

These two new domestic branches, while unique in the United States, are actually a continuation of Cromemco's customer support efforts. Cromemco's original support vehicle was the opening, last October, of a European subsidiary (located in Copenhagen, Denmark). Further branches are planned; and domestically, we can look forward to another U.S. office, located in Chicago—welcome relief for hundreds of users in the Midwest.

Individually, we can take pride in the fact that it was partly due to the input of users—through the IACU—that Cromemco embarked on this aggressive customer support program. It is also fair to note that, like E.F. Hutton, when users speak... Cromemco listens.

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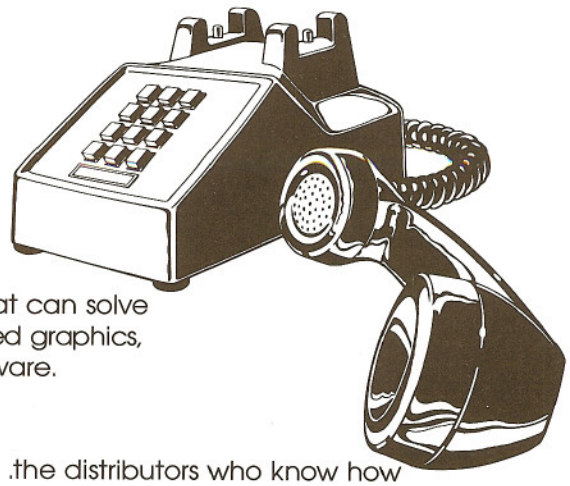

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Calculating Variable Expressions in SBASIC's Strings

by Roland G. Seiling

If you are one of those people who sit in front of a terminal—having a powerful micro at your fingertips—and still need a little handheld HP, or TI calculator around to solve expressions, then keep reading.

Assume that we want to find the costs of a house (15 x 11 meters). For example, how much concrete is needed for one ceiling .18 m thick? "Vol = 15 x 11 x .18," of course. This volume times the price of one cubic meter of concrete yields the cost. If you then want to use the same program for a building which is triangular (14 x 12), then it is calculated "Vol = (14 x 12)/2 X .20". It is obvious that the first formula would fail in the second problem. If it were part of the program, we would have to modify the program according to the new situation in case 2. What we need is a little routine which accepts a whole expression as a string variable, in which the raw data is presented to the computer and the results of the expression are calculated.

How can this be done? The expression "14 / 2 X 12 X .18" could be put into a string—for example, A$. The input could be from either the console or a disk file, containing all the measures and dimensions of the building. Then we would want to execute a statement like: "Vol = CALCULATE (A$)." Unfortunately, all the BASICs that I know of do not have such a nice CALCULATE function. We have to find another way to achieve the same results. Writing a little subroutine that goes through the string, character by character, and calculates the result of the expression represented by that string should not be too difficult, if we concentrate only on the basic mathematical functions (i.e. +, −, ×, /). But implementing parentheses recognition, higher math functions like SIN, COS, LOG etc., and the handling of variables or user defined functions would create a complex programming task.

All of these abilities are already built into our language interpreter—so why not use them? Our BASIC interpreter is doing the same thing whenever it reaches a line that consists of a LET statement and a mathematical expression. How can we use this ability of SBASIC? If only we could modify program lines dynamically during execution of the program, according to the user's input. Guess what, we can!

We print our expression (stored in A$) together with a LET-statement and a line number to a file, in our example 'Buffer', and then ENTER this file. This puts our formula in the place of the specified line within the program. The previous contents of this program line are overwritten, and our program is changed dynamically at execution time. The data, as well as the formula, have become part of the program.

Let's have a look at the following example:

```
 10  Dim A$(80)
 20  Escape = 27
 30  Input "Volume = ",A$
 40  Open /1/ "Buffer"
 50  Print /1/ " 90 Let Vol = ";A$
 60  Print /1/ Chr$(Escape);
 70  Close /1/
 80  Enter "Buffer"
 90  Rem ———this line will be
       replaced———
100  Print "Volume calculated =
       ";Vol
110  End
```

Continued on next page

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Calculating Variable Expressions in SBASIC's Strings

When this sample program is run the computer prompts for the question for Volume and the user might respond:

```
12.23 × 10.14 × (0.18 + 0.16) / 2
```

The line, printed to a file called "Buffer" on the current disk, would look like the following:

```
90  Let Vol = 12.23 × 10.14 ×
        (0.18 + 0.16) / 2
```

Nothing new. In line number 80 of that little demonstration program, this line is ENTERed to our program and becomes line 90. The SBASIC interpreter then proceeds with line 90 and calculates the result of our user defined expression (which could also be a single number), the variable 'Vol'. This result is now available to us (or, better, our program) for further processing. A handheld calculator is no longer needed next to your terminal.

Note that we sent an ESC character to the file, after the program line, to serve as an End-of-Program indicator to SBASIC's ENTER routine. Also, after having printed the future program line we have to close that file before we can ENTER a line from it. 'Buffer' has to be created prior to the first opening of the file.

So far, so good. This trick works, and can be used in a lot of applications where we have to use variable formulas rather than constant formulas together with variable data. But if you work with your Cromemco system interactively, you soon might find out that the process of OPENing, PRINTing, and CLOSEing the disk file is too slow for your application, and that there is too long a wait for the system to respond. If response time is critical to your application, keep reading.

If we use our Cromemco system in an interactive, dialogue-oriented environment, we might require a faster technique, and need a fast peripheral device. But we don't need to rush out and buy a new hard disk, or some such device. We already have the fastest peripheral device available at hand: the Random Access Memory (RAM) boards built into your computer.

What is needed is a method for accessing a tiny portion of that RAM memory—just enough to store that one line of code. In other words, we need a Device Driver that can Open, Print information into, Read information from, and Close an area of RAM Memory; as would be done with a File on the Disk. Since an assembly language listing of the SBASIC device drivers is provided with the SBASIC interpreter (and all necessary interfacing info too), the task of writing a Memory Driver should not be too difficult.

Rather than establishing a byte by byte transfer to and from the disk,

Continued on next page

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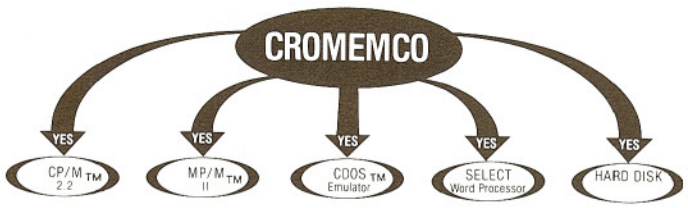

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we "Put" and "Get," byte by byte, to and from a section in our memory. This way of handling the above problem speeds execution and allows us to use our little trick in a fast and interactive style. Where can we put that program line in our memory?

SBASIC maintains a so-called Extended File Control Block for each file that is OPEN. This EFCB contains a couple of parameters needed to access the file correctly. Fortunately, within this EFCB, there is a buffer area to temporarily hold bytes moved through the file channel. Or, as Cromemco says, "...available to the user for accumulating individually passed bytes into a buffer." Buffer? That sounds familiar to us. Please refer to the appendix of your SBASIC manual 'ADDING DEVICE DRIVERS TO BASIC' for the layout of the EFCB and further information about it.

By utilizing the buffer within the EFCB, we can store our line of code without "eating" any more memory than would have been required by opening a disk I/O channel. Because the EFCB has a size of 179 bytes, and since program lines will never be longer than 132 bytes, there is room to store up to three short lines of code, should your application require it.

How do we integrate this additional driver into SBASIC? In our listing of SBASICIO.Z80 we look for a section labeled DDLIST (Device Driver List) and include pointers to our driver in that table. The following listing gives you the format of this driver's entry pointers and parameters. First locate the end of DDLIST, which is a byte labeled DDEND and has a value of 0. Now merge the pointers to our driver between the last entry and DDEND. Make sure DDEND is still there, as SBASIC uses this zero byte to detect the end of the driver list. But, before you start fooling around with your editor and SBASICIO.Z80, make a BACK UP copy of this file called CBASICIO.Z80, to have the original Cromemco version available in case something happens to the one

Continued on page 31

CROMEMCO 32K BASIC USERS

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CRT Terminal Graphic Mode

There are many methods to generate the CRT screen prompts. Some are to use the input statement, use the print and input statements, or print the screen and absolute address the input statements. Or you can use the graphic mode to generate a form on the screen and absolute address the input in the proper location. The combination of absolute addressing and inputs used on a graphic generated screen will be discussed in a later article. This article will review the generation of a form using the graphic mode in normal video only.

Cromemco's 3102 CRT terminal has a line graphic mode. This mode is a very useful tool in generating documents on the screen. The graphic mode has eleven graphic characters. These graphic characters may be displayed in normal video, half intensity, blinking or blinking half intensity. The graphic mode is turned on by sending an ESC R sequence and turned off with an ESC S sequence. This article will discuss the steps to set up a sequence to enter and exit the graphic mode using all eleven characters. The example will generate an input form on the screen and print the required headings in the form.

The following listing is only one method of generating a form on the CRT screen. This is a detailed discussion of the listing which generates a truck mileage invoice on the screen.

The close in statement 10 is used to close any channel which may have been left open. The first step, statement 20, defines a variable for clear screen. The second step in setting up the form using graphics is to define string variables for each of the eleven elements of the graphic character set. Reference the graphic mode of the 3102 terminal manual and the graphic characters table. Statements 30 through 130 define the control sequence for the graphic mode of the terminal. The code for string variables is as follows:

L'r'corner$	—	Left Right Corner
L'l'corner$	—	Left Left Corner
U'r'corner$	—	Upper Right Corner
U'l'corner$	—	Upper Left Corner
B'int$	—	Bottom Intersection
L'int$	—	Left Intersection
R'int$	—	Right Intersection
T'int$	—	Top Intersection
H'line$	—	Horizontal Line
V'line$	—	Vertical Line
C'line$	—	Cross Lines
Out$	—	Graphic Mode Off (Exit)
In$	—	Graphic Mode On (Enter)

Statement 200 prints In$ which is the control sequence to enter the graphic mode then print the left right corner element. The for/next statement is used to generate multiple horizontal lines which generate one continuous line across the screen. Note the semicolon after the H'line$ statement which removes the carriage return while in the for/next loop. There are two things to note while using the graphic mode: always exit the graphic mode before printing data or prompts; the tab value will be off as you add string variables to the graphic screen display. The tabs can be adjusted by adding to the tab value until the element is printed in the correct location.

The listing below will generate a mileage form designed for a trucking company. The example helps in designing a form to meet your needs.

```
10   Close
20   Clear'screen$=Chr$(27)+"E"
30   L'r'corner$=Chr$(64) : Rem CHR$(64)=@ IN THE NORMAL GRAPHIC MODE
40   L'l'corner$=Chr$(68) : Rem CHR$(68)=D
50   U'r'corner$=Chr$(72) : Rem CHR$(72)=H
60   U'l'corner$=Chr$(76) : Rem CHR$(76)=L
70   B'int$=Chr$(80) : Rem chr$(80)=P
80   L'int$=Chr$(84) : Rem chr$(84)=T
90   R'int$=Chr$(88) : Rem chr$(88)=X
100  T'int$=Chr$(92) : Rem chr$(92)=\
110  H'line$=Chr$(96) : Rem CHR$(96)=`
120  V'line$=Chr$(100) : Rem CHR$(100)=d
130  C'line$=Chr$(104) : Rem chr$(104)=h
140  Out$=Chr$(27)+Chr$(82)
150  In$=Chr$(27)+Chr$(83)
160  @ Clear'screen$;Tab(25);"BYRNE TRUCKING, INC."
170  @ Tab(26);"COMMON CARRIER"
180  @ Tab(27);"P.O. BOX 280"
190  @" MILES REPORT";Tab(22);"Medford, Oregon 97501"
200  @ In$;L'r'corner$; :   For I=1 To 19 : @ H'line$; : Next I
210  @ B'int$; :   For I=23 To 41 : @ H'line$; : Next I
220  @ B'int$; :   For I=42 To 57 : @ H'line$; : Next I
230  @ B'int$; :   For I=58 To 62 : @ H'line$; : Next I : @ L'l'corner$
240  @ V'line$;Out$;" SPEEDOMETER START ";In$;V'line$;Out$;
       "   DRIVER'S NAME    ";In$;
250  @ V'line$;Out$;" SPEEDOMETER END";In$;V'line$;Out$;"TRUCK";In$;V'lin
260  @ R'int$; :   For I=1 To 19 : @ H'line$; : Next I
270  @ C'line$; :   For I=23 To 41 : @ H'line$; : Next I
280  @ C'line$; :   For I=42 To 57 : @ H'line$; : Next I
290  @ C'line$; :   For I=58 To 62 : @ H'line$; : Next I : @ L'int$
300  @ V'line$;Tab(20);V'line$;Tab(40);
310  @ V'line$;Tab(57);V'line$;Tab(63);In$;V'line$
320  @ R'int$; :   For I=1 To 19 : @ H'line$; : Next I
330  @ T'int$; :   For I=23 To 41 : @ H'line$; : Next I
340  @ T'int$; :   For I=42 To 57 : @ H'line$; : Next I
350  @ T'int$; :   For I=58 To 62 : @ H'line$; : Next I : @ L'int$
360  @ V'line$;Out$;"MILEAGE: CA.";Tab(42);"TRAILER #";In$;Tab(67);V'line
370  @ R'int$; :   For I=1 To 62 : @ H'line$; : Next I : @ L'int$
380  @ V'line$;Out$;"MILEAGE: TOTAL ";Tab(40);"DEADHEAD MILES: ";
     In$;Tab(67);V'line$
390  @ R'int$; :   For I=1 To 27 : @ H'line$; : Next I
400  @ B'int$; :   For I=31 To 41 : @ H'line$; : Next I
410  @ B'int$; :   For I=42 To 52 : @ H'line$; : Next I
420  @ B'int$; :   For I=53 To 62 : @ H'line$; : Next I : @ L'int$
430  @ V'line$;Out$;"      FROM      TO      ";In$;V'line$;
440  @ Out$;"  PICK-UP  ";In$;V'line$;Out$;" STATE LINE";In$;V'line$
     ;Out$;" DELIVERY ";In$;V'line$
450  @ R'int$; :   For I=1 To 27 : @ H'line$; : Next I
460  @ C'line$; :   For I=31 To 41 : @ H'line$; : Next I
470  @ C'line$; :   For I=42 To 52 : @ H'line$; : Next I
480  @ C'line$; :   For I=53 To 62 : @ H'line$; : Next I : @ L'int$
490  @ V'line$;Tab(28);V'line$;Tab(40);V'line$;
500  @ Tab(52);V'line$;Tab(63);V'line$
510  @ V'line$;Tab(28);V'line$;Tab(40);V'line$;Tab(52);V'line$;
     Tab(63);V'line$
520  @ U'r'corner$; :   For I=1 To 27 : @ H'line$; : Next I
530  @ T'int$; :   For I=29 To 39 : @ H'line$; : Next I
540  @ T'int$; :   For I=41 To 51 : @ H'line$; : Next I
550  @ T'int$; :   For I=53 To 62 : @ H'line$; : Next I : @ U'l'corner$;
     Out$
560  End
```

About the Author

Michael Turnage is the President of Turnage & Turnage Ltd., a software development company in Long Beach, California. He has been programming in BASIC for seven years. His experience includes Data General, IBM 34/38, Hewlett Packard and Cromemco computer systems. Some of the custom software packages written are Data Base, Mailing List, Independent Trucker, Financial, Income Tax, and Engineering Utility.

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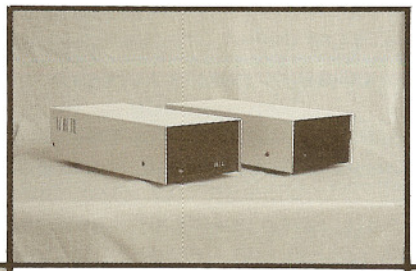

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CDC Phoenix and Lark Subsystems
(not shown)

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8" Combination Pack

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FEATURES

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X-ON, X-OFF Protocol Available

A fundamental problem with using a serial printer through a TUART serial port under CDOS at a baud rate of over 300 (or thereabouts) is that the CPU tends to overrun the printer buffer. Don Szenina of Professional Data Corporation in Marquette, Michigan offers a short, simple patch which allows the printer to run at full speed, whatever that particular printer's speed is. The patch is offered to IACU Members for only a nominal handling charge. Szenina can be reached at 1015 North Third Street, Marquette, MI 49855, or by phone at (906) 228-2626.

Single-sided Drives & Double-sided Diskettes

If you are using single-sided 8" drives (e.g., PerSci 277), you may want to try this method to increase diskette storage capacity. Newer Cromemco diskettes (as well as some other brands) can be used as single- or double-sided by covering the appropriate sync hole in the sealed envelope. This means that, when used as single-sided you have a perfectly good side going to waste.

After covering the double-sided hole, hold the diskette with the sync hole up and the slot down. You will notice that the single-sided sync hole is only slightly off-center. If another hole existed in the envelope that was off-center the same distance in the other direction, the diskette, the diskette would by symmetrical. You could then flip the disk over and use the other side, doubling its storage capacity.

To convert your diskettes, make a template out of paper, or use one face of an evelope from a scrapped diskette. Use this to mark a mirror image hole in the front and back sides of the envelope under conversion. Use a plier-type one-hole punch to punch the ENVELOPE ONLY. Protect the diskette surface by inserting a slip of paper between the diskette and the envelope. Warning: This procedure requires a good eye and a steady hand.

Submitted by Pat McGuire, Buena Park, California.

NY — Tri-state Users' Group Holds Initial Meeting

Charles Perrella reports that the initial meeting of a start-up users' group serving New York, New Jersey and Connecticut was attended by representatives of five companies as well as one dealer. The next meeting

COMDEX Tickets Available Through IACU

Going to COMDEX in Las Vegas (Nov. 19 - 19 Dec. 2)? If so, contact IACU immediately for free Guest Tickets, compliments of Cromemco. The tickets can get you pre-registered for free admission to the Exhibit Floor of the Las Vegas Convention Center. COMDEX boasts more than 1,000 exhibitors this year, making it the largest microcomputer show in history. Also, it promises to be a fun experience, almost like a class reunion with all the faces out of the past one is bound to see. If you plan to attend, contact us as quickly as you can. We only have limited supply of tickets.

PerSci Announces Change in Ownership

Jana Enterprises, Inc., a former minority shareholder of PerSci, Inc. has acquired all of the outstanding stock of PerSci. Jana Enterprises expects to continue PerSci in its current business and to add some additional activities from its other businesses. The company will continue to operate as PerSci, Inc.

Crohorts Feature Guest Speaker

Crohorts, the West L.A. Cromemco users' group, has a treat in store for members at the November 9th meeting. The scheduled guest speaker is Dr. Harry Garland, Cromemco's president. And the subjects to be discussed include the new C-10, along with a hands-on demonstration. We expect to attend this meeting and will bring you a report next issue.

Arizona Users View Color Graphics

The Arizona Association of Cromemco Users visited KPNX-TV studios in Phoenix for a demonstration of color graphics by their gracious host, Ed Phillips, station meteorologist. KPNX is one of a group of TV stations that use Cromemco Color Graphics systems to generate their on-the-air weather displays. Although there is a great deal of complexity in such a display, Phillips, reportedly, made it look quite easy and took a great deal of his own time to answer questions for the visitors. To affiliate with the group, call JoAnn Drake at (602) 993-9589.

CUGH Operational

With this letter I want to bring you up to date on the situation regarding the organization of a Cromemco users group in Holland. This group, called the Cromemco Users Group Holland, the CUGH for short, now exists.

The management at present consists of myself as President, and Mr. J.W. Joehler as Secretary. Mr. Koehler's address is: Postbus 120, 2910 AC Nieuwerkerk a/d IJssel.

Since the date of our foundation, the CUGH has met at one month intervals, with attendance during the most recent gatherings 5 and 6 respectively.

I want to thank you for your support so far, which has been essential to bringing us to this point in our development. Thanks also for your offer for further assistance.

Various new efforts at making our existence known are now under way, and we hope that in a few months' time our number will reach the size for the common effort to start really paying off.

We hope to keep you informed.

With kind regards,

Sincerely,

Ruben van Wezel

Please

Be aware of the SaCromemco Users Group based in Sacramento, Ca. Cooresponding Secretary is Alan Whitman, 2613 Cabernet Way, Rancho Cordova, CA 95670. Phone: (916) 635-6070. Please note our address in I/O News.

Thanks for the I/O News, which gets better each issue!

Thank you,

Clinton Pace MD #00089

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Soft Tips

SOFT TIPS is a regular column aimed at providing software oriented hints and ideas for non-programmers. Members are encouraged to send in tips that can help a user better use his/her system. SOFT TIPS is designed to put forth ideas that are general in nature. The column is edited by Norman Vadnais, Director of Cromemco Activities at Applied Research, Inc. (ARI), a Los Angeles Area dealer. Members contributions can be sent to SOFT TIPS, in care of I/O News.

Letting Cromix Run Your System

An often mentioned feature of Cromix is the password protection system featuring separate and distinct access privileges for a file's owner, the group owning the file, and the general public. Access privileges for a file's owner and for the general public are rather self-explanatory, but the group owning the file (not to be confused with the file owner's group) can be the most powerful of the three and with the file owner's group) can be the most powerful of the three and offers many options for its use. On a development system, especially a system utilizing two or more languages of development, it can be a problem for two or more users to work on one project, share the files associated with that project, and still have some level of password protection. The best method for avoiding this problem is to create a new group with no members and assign the project to that group. This is done using the '– g' option of the password utility (be sure the file /etc/group exists for proper operation). Using the group utility, each user can become a member of the project's group and have full access to the files involved, and yet still have no access to each other's files.

Two things must be understood to make this idea work, the group utility and the default access privileges of your system. The group utility is not well documented (mentioned only in an early Cromix SUDS Note), but it is easy to use. Simply type **group (groupname)** and answer the password prompt. By doing so correctly, the user changes groups yet retains his login name. To return to normal status, simply type 'ex' at the CROMIX prompt. The default access privileges of the system must include all accesses (Read, Execute, Write, Append) at the group level for this scheme to work. To obtain this you must modify the Cromix on both your boot disk and root device disk with either Crogen (if you are familiar with it) or the following sequence (your inputs are bold faced):

```
% patch /cromix.sys
>s 1b
00001B: 03 f
00001C: 03 .
>e
```

Do I Have To Buy A 3102?

A question often asked by prospective and current and current Cromemco users alike. The answer is a resounding, well let's say a conditional, no! Cromemco's operating systems and utilities can be modified to run most any terminal. CDOS is terminal dependent in only three area: its implementation of function keys; CDOS system call 142; and the Screen editor. A terminal's function keys and CDOS call 142 are no problem if your I/O drivers are installed correctly. CDOS Screen can also be modified, but it normally takes a skilled assembly programmer. Details can be obtained from your Cromemco dealer.

Cromix is terminal dependent in four areas: function keys; CDOS call 142; the Screen editor; and the online help manual. The fnkeys mode of the ttys contains the specific handshake used by the 3102, any other terminal that requires handshake is not advised. CDOS call 142 is pre-programmed for a 3102 and there is no simple way to change this, it is best avoided. Cromix Screen is modifiable just the same as CDOS Screen, again it is best to consult your dealer. Help is terminal dependent in two areas, the Up and Begin commands and its prompts. The Up and Begin commands of help print the 3102's clear screen command before displaying the help file. Though this may not agree with your terminal, it will usually not hurt performance. All of help's prompts are contained in two straight forward ASCII files and can be modified with Screen or most any text editor.

/usr/help/help.msg contains the header for the help menu and usually contains a clear screen code. Modify this code and you are ready to go (Hint: the ^[is actually only one character, representing escape). /usr/help/msg.msg contains four one-line prompts containing various special effects. Two options are available for handling these special effects, removing them altogether or modifying them to match your terminal. To remove them altogether, run **maklink –f /usr/help/msg1.msg /usr/help/msg.msg.** To modify the special effects, use Screen or most any text editor and edit the file as you did the one above.

Quick Notes

Version 11.11 of Cromix arrived too late to be thoroughly covered in this edition of SOFT TIPS, so look for information on this new version next time. A few items are worth mentioning now, however. The modes needed for [PROGRAM] in the last edition of SOFT TIPS will need to be changed, more on that next time. A few bugs have been noted already: Screen does not print a return after printing an error message (the cursor simply does down one line); Match does not match a '[' unless it is used as [[] (otherwise it matches nothing); Sim does not ignore CDOS call 31. Other than these so far so good!

Continued on next page

In the last edition of SOFT TIPS, an important alternative when looking for more TPA was left out. By removing the function keys from CDOS you can increase the TPA up to 5 Kilobytes. Simply respond 'None' when Cdosgen asks what type of function key decoding is desired.

Also in the last edition of SOFT TIPS, the spacing on the TOF command file was not too clear, so we will repeat it here:

```
spool -k -->*/dev/null
spool -p 9</dev/null>*/dev/
  null
```

Handy Command Files

The ability to make decisions is one of the most important features provided by a computer, but most often an ability only available to true programmers. Cromix, however, offers the average user this capability through its command files. Over the next few issues all aspects of the decision making capabilities of Cromix command files will be covered, and the command files featured will offer examples of these features whenever possible.

The most basic decision making process is the test of equivalence or non-equivalence. For these Cromix offers the if and goto commands to test relationships and execute different lines of code based on the result. The if command, in its relational mode, will test two strings to be equal (=) or not equal (!=). The command line would be: **if string – 1 operator string – 2 command.** Make sure to leave a space on both sides of the operator and it is best, though not necessary, to enclose both strings in quotes. Most often the goto command is used at the end of the if command. Goto allows jumps, both forward and backward, to be made throughout a command file, and its command line is **goto line label.** A line label is simply a line with a % in column one and the label immediately afterward.

More details on command file decision making, including looks at other Cromix commands that support it, will be in the next edition of SOFT TIPS. For examples of what has already been presented, look at the second and third command files listed in this SOFT TIPS.

Name: LOGOFF
Purpose: Controlled exit from the system offering more than the standard Cromix login prompt.
Setup: None required
Listing:

```
  echo -n '^[E'
  time
ty /etc/startup.msg
  kill -3 0
```

Notes: The above listing is only an example, any commands desired can be put before the last line. In this example, the first line clears the screen of the 3102 terminal. The time utility is then called to show the system date and time at the top of the screen. The standard start-up message is displayed by the third line; this is the same message displayed upon system boot. The final line will abort all current processes of the user, except those set running in background, and log him off the system. In other words, this line will issue the standard Cromix login prompt.

Warning: This procedure proves fatal if run by a privileged user from a terminal that had originated the Cromix Spooler. In that situation, a privileged user should simply use 'ex' to log off the system.

Example:

```
% logoff
    Wednesday, August 18, 1982
      18:04:00
```

For information about Cromix, log in as "newuser." Any user may access this same information by typing "newuser" once logged in.

CROMIX Operating System version 11.05. Copyright © 1980, 1982 Cromemco, Inc.

Login:
Name: LBAK
Purpose: To list backup files for possible deletion.
Setup: Non Required
Listing:

```
 if '.#1' = '.-a' go to all
 %visible
  1 -s **bak
  ex
 %ALL
  - -s **bak .**bak
```

Notes: LBAK operates in two modes, standard and with a -a option. The -a option is equivalent to the -a option of 1 (Cromix list utility) and includes all invisible backup files in its listing (invisible files are those starting with a .). The first line of our command file uses the if command to test for the -a option. If it exists, control jumps to the all section of the file, otherwise control continues with the visible section. The visible section lists all visible files ending in bak and, by use of the -s option of 1, will summarize the disk space used by those files. The all section lists all visible and invisible files and will again summarize disk space used. If no bak files of the type(s) requested exist, the list of files is replaced with the message **No match: "**bak"** or **No match: ".**bak"**.

Example:

```
% 1bak
    163  1 check.bak
    331  1 fixsb.bak
     84  1 1bak.bak
    745  1 query.bak
    580  1 tipbatch.bak
5 files  7 blocks  1,903 bytes
```

Name: DELBAK
Purpose: To delete backup files.
Setup: Non Required
Listing:

```
 if '.#1' = '.-a' goto all
 %visible
  del -v **bak
  ex
 %all
  del -v **bak .**bak
```

Notes: DELBAK is the complement to LBAK and will delete all files listed by LBAK. It also incorporates a -a option for inclusion of invisible files. By use of the -v option of del, all files being deleted are listed on the screen. If no bak files of the type(s) requested exist, the message **No match: "**bak"** or **No match: ".**bak"** is printed.

Example:

```
% delbak
check.bak
fixsb.bak
1bak.bak
query.bak
tipbatch.bak
```

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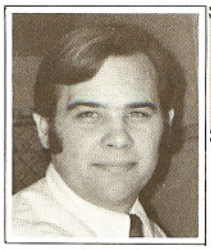

tec·tips

TEC TIPS is a regular column aimed at providing hints for keeping systems up and running. It will not attempt to deal with specific engineering applications or non-standard configurations. TEC TIPS is edited by Richard Quinn, owner of QUINTEC, a Southern California Computer service firm.

Bringing Up Other CRTs in CROMIX

In a recent issue of I/O News, there was a tip regarding the installation of a resistor to pull up the RS232 on the TU-ART. This enabled terminals that were not on line when the system was booted to come on when powered up. This was a good tip, but the inherent problem was solved with the most recent version of CROMIX (Version 11.11). The system responds like it did with Version 10 CROMIX. When the terminal comes on line, the Login message appears even if the system is booted.

We have also run some software written for CP/M that would not previously run under CROMIX without a simulator. It is really nice and I feel that a whole new world of software is opening to Cromemco users. When you get the new version of CROMIX, be certain to get the latest manual as it contains much new information.

Diagnostics Package

I know that most dealers are aware of the diagnostics software that Cromemco puts out, but many users are not. There is a fine package of software for $195 that includes many tests for disk drives (both hard and floppy), memory tests, CRT tests, and so forth. It can be invaluable in testing a system for trouble or in detecting potential problems. It is available through any dealer and comes with documentation, although some of the programs are for advanced users.

RPM Adustments for Disk Drives

With the new versions of CDOS and CROMIX a very useful feature has been added. The INIT utility reports on the RPM of the disk drive that has been selected. This feature allows you to use INIT to test and adjust the drives for best performance. In order for the results to be correct, make certain that the CPU switch (on the ZPU card in the computer) is on 4 (4 megahertz). Then run INIT on the drive to be tested. Be certain that a disk is in the drive to provide the proper amount of drag on the motor. In all cases you will be checking for the proper RPM (300 for 5" floppies, 360 for 8" floppies, 4800 for 5 megabyte hard disks, 3600 for 11 megabyte hard disks), the proper insertion and pressure on the plastic hub that closes on the disk, and the proper belt tension and traction.

Only 5 inch floppies can be adjusted. On the older Wangco disk drives the adjustment was a small potentiometer on the lower middle of the printed circuit card. The new Tandon drives have a 10-turn pot on the motor control card mounted on the tail end of the drive. Both drives may have to be removed to get to the adjustments. Use a short extension cable for the power if needed.

After the RPM is reported you can type CNTL C to cancel INIT. Reload INIT several times as you adjust the drive to confirm that the RPM is stable and correct.

While you can't adjust the RPM on the 8 inch Persci drives, you can tell if the belts are in good shape. On all 8 inch disk drives, the RPM should be close to 360. If it changes after running INIT several times, remove the drive and clean the drive belt.

The newer 299 double sided drives use an AC motor that is very stable for RPM. Therefore, if RPM is unstable, clean or replace the belt and check the center hub for a proper fit.

If you do clean the belts, use only denatured alcohol and be certain to use lint free rags. Do not use any oils or lubricants.

Hard disks cannot be adjusted for RPM. Don't worry if the RPM is slow or fast. The most important thing to look for in a hard disk is a stable speed. If a drive reports 3550 RPM the first time and 3650 the next, it is more an indication of problems than if it always reports a steady RPM. In hard disks look for drifting (more than a 20 or 30 RPM difference each test) RPM rather than exact RPMs. BE CERTAIN TO HIT CNTROL C after testing your hard disk for speed. DO NOT continue or it will wipe out all data on the disk.

Power Plug in Hard Disk Drives

The 11 megabyte hard disk drives use a 10-conductor power cable that goes from the power supply, located on top of the drive enclosure, to the hard disk drive itself. I have often seen these plugs run hot and begin to oxidize causing random disk failures. The problem is especially true in areas without air conditioning where the temp is high or the humidity is high. Coastal regions are likely areas for trouble.

There are two 10-pin connectors; one on the power supply end and the other on the disk drive. You can eliminate the one on the power supply end, but you should leave the one on the drive end. Examine the connectors for hot wires, discoloration, and melted insulation. If you are familiar with the use of a good digital voltmeter you can test for voltage drop, especially on the ground (black) lines.

To solve the problem, simply remove the connector and connector pins from the printed circuit board of the power supply. It is necessary to de-solder the pins of the transistors and remove the mounting nuts in order to get to the reverse side of the board. After removal, cut the plug off the cable, strip the wires and insert them in the proper holes. After soldering, re-install the board and re-solder the transistor pins. This eliminates the bad plug.

If the connector on the drive end is bad, replace it with a good quality 10-pin connector. Look for a connector with high contact pressure. The

Continued on next page

tec-tips

solder types are usually best for replacement purposes. Do not remove the connector as this will make drive servicing/replacement difficult and may damage the drive.

Using Tape to Test Cards

Occasionally you will get a circuit card that "grabs the bus." That is, it will not let the system come up. If it is not one of the essential three (ZPU, MEMORY, FDC) you can cover the edge contacts with tape to break the connection and determine which line is holding the bus. Trace the line back through the circuit schematic and look for probable causes. This works well with TU-ARTs, WDIs, 64KZs other than the system card, graphics cards, etc.

Ground Straps on Hard Disk Drives

The latest hard disk drives are being shipped without the familiar ground strap to the center of the drive motor spindles. They are not missing, but have been moved inside the drive. This is good news because the straps on older drives used to "sing" and needed cleaning occasionally. While this caused no operational problems, the noise was a bother. The new IMI drives are really quiet and smooth running. Many improvements have been made since they first came out.

New 64KZ-II

We have been receiving some of the newer, cheaper, and much better 64KZ memory cards. They are GREAT!! The big difference is that most of the major control circuits on the card are handled by an LSI memory controller chip that eliminates many of the previous chips. The new cards have 57 ICs while the old cards had 78. That means cooler, longer-life cards for less money.

In addition to the new design, the card has no sockets, with the exception of the LSI chip. That's good news and bad. The bad news is that it makes them harder to service. The good news is they won't suffer from the bad sockets that Texas Instruments makes. Approximately half of all system failures I service come from those poorly designed Texas Instrument sockets. (No fault of Cromemco that TI can't make sockets.)

There is one small problem with the new cards. The switches are in a different order. On the old 64KZ, SW1 was address and SW2 and SW3 were bank select. On the new card, the order of the switches is reversed. Use this table to help keep things straight.

Old 64KZ	New 64KZ-II
SW-1	SW-3
SW-2	SW-1
SW-3	SW-2

Outside of this minor difference, all things should be equal when setting the switches, except that the new board has the new high profile switches that make setting easier. The price is low enough that some of my customers are trading in their old boards for the new, thus increasing overall system realiability.

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Accessing Terminal Attributes Through The 'C' Language

by Jordan Siedband

One of the nice things in 32 Structured BASIC is the fact that terminal enhancements may be accessed by declaring the device "$CO" and using print\1,0\ to clear the screen, etc. Not all of us possess Cromemco 3102 terminals, nor do we care to do so. I find that there are many fine intelligent terminals available, and I choose those which are both cost effective and adequate to the tasks allocated.

The 'C' Language opens up entire new vistas for the smart terminal. I have included the following as a guide to other users since I have in-

Continued on next page

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Accessing Terminal Attributes Through The 'C' Language

included only the attributes for a very fine CRT, the Ampex Dialogue 80. The file, ampex.h, will serve as a template for your terminal. Add any other enhancements, delete those which you do not have. In other words, make your own enhancements!

```
        /*  cursor and terminal attributes */
        /*  must include  terminal attr, e.g.,  ampex.h  */
        /*  J.Siedband    8/07/82   */

cursor(x,y)
int x, y;
{
        putchar( LEADIN);
        putchar( CURS_LEAD);
        putchar( y + 31);
        putchar( x + 31);
        return();
}

        /* special terminal attributes */

attr(x)
char x;
{
int i;
   putchar( LEADIN);
   putchar( x );     /* if x clears line or page, delay by 10 nulls */
   if (x==_clr_all || x==_clr_unp || x==_clr_eol || x==_clr_unp_eop)
                for (i=0;i<10;++i)
                        putchar('\0');
        return();
}

strcopy(from, to, n)
char *from;
char *to;
int n;
{
        while (n-- > 0)
                *to++ = *from++;
}
        /* console attributes for Ampex Dialogue 80 */

#define LEADIN           27
#define CURS_LEAD       '='

#define _attr_on        'A'     /* attr on                          */
#define _attr_off       'a'     /* attr off                         */

#define _clr_all        '*'     /* clear screen                     */
#define _clr_unp        '+'     /* clear unprotected only           */
#define _graphics       'G'     /* graphics charicter lead-in       */
#define _clr_eol        'T'     /* clear to end of line             */
#define _clr_unp_eop    'Y'     /* clear unprotected to eop         */
#define _flip_on        'v'     /* enable 'flip'                    */
#define _flip_off       'w'     /* disable auto-flip                */
#define _kbd_enable      34     /* keyboard enable                  */
#define _kbd_disable    '#'     /* keyboard disable                 */
#define _blink_on       'n'     /* blink on                         */
#define _blink_off      'o'     /* blink off                        */
#define _begin_prot     ')'     /* begin protected field            */
#define _end_prot       '('     /* end protected field              */
#define _prot_on        '&'     /* turn on protect                  */
#define _prot_off        39     /* turn protect off                 */
#define _send_line      '4'     /* send line (block mode)           */
#define _send_page      '5'     /* send page (block mode)           */
#define _aux_send       'P'     /* aux send                         */
#define _char_del       'W'     /* character delete                 */
#define _char_insert    'Q'     /* character insert                 */
#define _line_insert    'E'     /* insert line                      */
#define _underln_on     '1'     /* underline on                     */
#define _underln_off    'm'     /* underline off                    */
#define _reverse_on     'j'     /* reverse field on                 */
#define _reverse_off    'k'     /* reverse field off                */
```

Calculating Variable Expressions in SBASIC's Strings

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that you're working with.

```
DDLIST:  DB   'SY'        ; System labeled '$SY'
         DW   DRTUART     ; uses the tuart driver
         DB   0,0         ; Note that SY does not
         DB   0,0         ; have to be the first
              0,0         ; entry
              0,0
              0,0         Here we find pointers to
              0,0         other drivers, like
              0,0         LP, PU, RD, T5, CO etc.
              0,0
              0,0
         ; And this is the part which we have to
         ; add to DDLIST : (all lines with * at end)
                          ;
         DB   'BU'        ; here is the entry for *
                          ; our '$BU ffer'        *
         DB   DRBUFF      ; uses the Bufferdriver *
         DB   0,0         ; no extra info profided *
         DB   0,0         ;                       *
                          ;                       *
DDEND:   DB   0           ; Note:
                          ; This byte is important !!!
                          ; to signal the end of DDLIST
```

Since the DDLIST dispatch table is now modified to include our Buffer device, we also have to include the driver routines to SBASICIO.Z80. The Assembly listing of the driver must be merged into the driver area of SBASICIO.Z80, preferably at the end.

Your listing of the driver area might look like this (or similar):

```
DRLPT:       0        ; Lineprinter driver
             0        ;
             0        ;
             0        ;
DRCON:       0        ; Console driver
             0        ;
             0        ;
             0        ;
DRTUART      0        ; general purpose TUART
             0        ; driver
             0        ;
             0        ;
             etc.
             etc.
             0        ;
             0        ; last code
             0        ;
             0        ;
             END

DRLPT:       ''       ; Lineprinter driver
             ''       ;
             ''       ;
             ''       ;
DRCON:       ''       ; Console driver
             ''       ;
             ''       ;
             ''       ;
DRTUART      ''       ; general purpose TUART
             ''       ; driver
             ''       ;
             ''       ;
             etc.
             etc.
             ''       ;
             ''       ; last code
             ''       ;
             ''       ;
             END
```

Right before the END of this listing we include the following code, which is the Buffer Driver. Please keep in mind that we have to keep the END statement in the assembler listing at the end and that this means AFTER the insert. Otherwise, the assembler would not properly assemble this driver.

Continued on next page

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Calculating Variable Expressions in SBASIC's Strings

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PROGRAM

Note: This is the device driver for our high-speed SBASIC to Memory Buffer file. Note that this portion has to be merged into the device driver area of SBASICIO.Z80, and also note that this thing never works alone. We have to have a proper entry in the DDLIST area of the same program.

```
MAX     EQU     190     ; HIGHEST BYTE ADDR. IN EFCB
COUNTER EQU     8       ; IY OFFSET FOR BYTECOUNTER
                        ;
DRBUFF: DW      BFOPEN  ; OPEN BUFFER
        DW      DUMMY   ; NO CLOSE ROUTINE
                        ; MAKE SURE DUMMY IS XOR A, RET
        DW      DUMMY   ; NO SET BUFFERPOINTER
        DW      DUMMY   ; NO GET STATUS ROUTINE
        DW      BFPUTC  ; PUT ONE CHAR INTO BUFFER
        DW      BFGETC  ; GET ONE CHAR FROM BUFFER
        DW      0       ; RESERVED
        DW      0       ; RESERVED
                        ;
BFOPEN: LD      (IY+COUNTER),EFCBFREE
                        ; LOAD THE BYTECOUNTER WITH THE
                        ; START OF THE  BUFFER IN  EFCB
                        ; MAKE SURE EFCBFREE IS DEFINED
        CALL    DUMMY   ; CLEAR A, SAYS OPEN O.K.
        RET             ; AND RETURN TO SBASIC
                        ;
BFPUTC: PUSH    HL      ; SAVE REGS. USED
        CALL    SETHL   ; SET HL POINTING TO
                        ; NEXT BYTE TO BE WRITTEN
        LD      (HL),A  ; PUT IT AWAY
        POP     HL      ; RESTORE REGISTERS
        RET             ; AND RETURN TO BASIC
                        ;
BFGETC: PUSH    HL      ; AGAIN, SAVE REGISTER HL
        CALL    SETHL   ; LET IT POINT TO NEXT BYTE
        LD      A,(HL)  ; LOAD THAT BYTE INTO A
        POP     HL      ; RESTORE REGS. FROM STACK
        RET             ; AND GO BACK TO BASIC
                        ;
SETHL:  PUSH    AF      ;
        PUSH    BC      ; SAVE BC FOR LATER USE
        PUSH    IY      ; IY HOLDS THE ADDRESS OF EFCB
        POP     HL      ; MOVE IT INTO HL REGISTER PAIR
        LD      B,0     ; MOVE A ZERO INTO B
        LD   C,(IY+COUNTER)
                        ; RETRIEVE THE BYTE POINTER
        ADD     HL,BC   ; ADD BOTH TO GET ADDR. OF NEXT BYTE
        INC     C       ; INCREMENT BYTE POINTER UP ONE
        LD      A,C     ; PUT THE NEW BYTE COUNTER INTO A
        CP      MAX     ; IS IT EQUAL TO MAX BYTES
        JR      NZ,SHLOK; NO, EVERYTHING IS O.K.
        LD   C,EFCBFREE ; YES, START FROM THE BEGIN
SHLOK:  LD   (IY+COUNTER),C
                        ; PUT THE BYTE COUNTER BACK
        POP     BC      ; AND RESTORE THE BC REGISTER
        POP     AF      ; AS WELL AS AF
        RET             ; AND RETURN TO CALLER
                        ;
```

SBASICIO.Z80 is ready to be reassembled. Check that DUMMY and other routines and variables used in this test are defined within SBASICIO.Z80. Using the Cromemco Macro Assembler we then produce a file called SBASICIO.REL which, in order to enable BASICGEN to include these drivers, we must rename SBASICIO.SBR. Any other CP/M Z80 Assembler should also do (maybe with some minor modifications in the program code). BASICGEN should now be run to obtain a version of SBASIC which includes our Memory Driver. Now you are ready to run the example—with greatly improved speed (see below). Please refer to your SBASIC manual for further information on the BASICGEN utility.

```
 10 Dim A$(80)
 20 Escape = 27
 30 Input "Volume = ",A$
 40 Open  \1\ "$BU"
 50 Print \1\ " 90 Let Vol = ";A$
 60 Print \1\ Chr$(Escape);
 70 Close \1\
 80 Enter "$BU"
 90 Rem -----this line will become replaced-----
100 Print "Volume calculated = ";Vol
110 End
```

I agree that this is not the largest I/O driver I've seen, but then dynamite can come in small packages, too. This driver can be modified and improved (with a reduction in time consumption) with the use of T-cycles. My hope is that fellow Cromemco users will find this little trick as helpful as I have. No longer is it necessary to sit at your terminal, armed with a hand held calculator. Last, but not least, I KNOW that one should not write self-modifying code, but I'm sure you will have mercy on me if it works this simply.

About the Author

Roland G. Seiling is a Software Engineer and the President of TESCO Gmbh, a software consulting firm in Wiesentheid, West Germany. He can be contacted by mail at P.O. Box 501, APO, NY 09031.

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Eliana Ferrada, Administrator
Friedmut Ballek, Sr. Engineer

Major Market Area: Most of Chile. Local service is now being offered in Santiago, Valparaiso, Concepcion and Africa.

PERSOCOM
Peru 103, Piso 8
1067 Buenos Aires
Argentina
30-4498/Telex: 390-17341 ITEL-A RMMM

Persocom SA is the holding company of Plus Computers SA. Plus is marketing a full line of CROMEMCO products along with other IBM-compatible products.

Key Personnel: Esteban Gimenez Vives, President, General Manager
Raul Manuel Avila, Director of Operations
Roberto Boldrini, Director of Technical Support

Major Market Area: All of Argentina, with special emphasis in the Buenos Aires area.

International
England

COMART LIMITED
Little End Road
Eaton Socon
St. Neots, Huntingdon
Cambridgeshire PE19 3JG
UNITED KINGDOM
(0480) 215005/Telex: 851-32514 COMART G

Continued on next page

Dynamic UK distributor—20,000 sq. ft. warehouse. Full CROMEMCO range of hardware, software, and peripherals for stock, demo and training. Nationwide network of dealers. Sales, plus full hardware and software support. Warranty service, plus maintenance and service repair at nationwide and local levels. Extensive testing and development facilities.

Key Personnel: David Broad, Managing Director
John R. Lamb, Marketing Director
David Fear, Sales Director
Peter Webster, Product Marketing Mgr.

Major Market Area: Nationwide UK and Eire

Ireland

LENDAC DATA SYSTEMS, LTD.
8 Dawson Street
Dublin 2, Ireland

Suppliers and supporters of the full range of Cromemco Computer Systems and software.

Key Personnel: Don Lehane, Director, BSC (Computer Science)
Danny McNally, Director, BSC (Computer Science)

Major Market Area:
Sales & Service: Throughout Ireland

Europe

AGRO MARKETING
B Adzije 7/1, 41000 Zagreb
Yugoslavia
41 417-662 Telex: 862-21741 YU AM 2G

Large full-service facility, with complete line of Cromemco products and proprietary software. Specializing in software development, interfacing, and special medical computerized equipment.

Key Personnel: T. Raguz, Director (Marketing)
N. Ivancic, Software Manager
B. Krtolica, Customer Support (Hardware)

Major Market Area:
Sales & Service: Internationally, primarily Yugoslavia

VOLLWOOD B.V.
Prunellalaan 3
P.O. Box 128
5582 HB, Waalre
The Netherlands
31-04904-5865/Telex: 844-59175

Computec Benelux is a "daughter" of The Vollwood Organization, a holding company with working companies in many European countries. Active in selling business-type applications where CROMEMCO hardware with a wide choice of terminals, is provided to OEM'ers and subdealers. Specializes in hardware maintenance and adaptations in the hard software.

Key Personnel: Mr. H. Oosterveer, Purchasing, Vollwood
Mr. M. Scheller, Germany
Mr. J.W. Rozema, The Netherlands

Major Market Area: Germany and the Netherlands

C.T.A. COMBITEXT AUTOMATION
Klein Loolaan 23
3972 KB Driebergen
The Netherlands
03438-18888/Telex: 844-40444 CTA NL

A leading company in the Benelux, in the micro computer market. Represents CROMEMCO computers in these countries. CTA specializes in selling to OEM's, large computer users, and self-programming customers. End-users are supplied with application software via CTA software houses.

Key Personnel: P.H.J.M. Haffmans, Managing Director CTA Int'l
N. Van Den Bosch, Managing Director CTA Computers
F. Arnolds, General Manager/Software

Major Market Area: The Netherlands

DIALOG COMPUTER SYSTEME GMBH
Frankfurter Allee 1-3
6236 Eschborn 1
West Germany
06196-46060/Telex: 841-415601 TELEP D

CROMEMCO distributor for the BRD, with a large full hardware-service capability. Offers software support to the CROMEMCO software packages. Primarily serves system and software houses.

Key Personnel: . Mr. M. Scheller, Managing Director
Mr. W. Krainski, Techn. & software sales support
Mr. W. Moos, Service Manager

Major Market Area: Primarily West Germany

UNICOMP SPA
Via Fratelli Gracchi, 48
20092 Cinisello Balsamo (Milano)
(02) 6121041 (5 linee r.a.) Tlx: 843-340274 UNICMP

Inventories complete line of Cromemco hardware and software in Italy, with a market extending into Greece. A four-year-old distributor firm, Unicomp offers sales and support of the full Cromemco line for business, scientific and industrial applications.

Key Personnel: P. DiCamillo, Managing Director
S. Focardi, Sales Director
F. Montanari, Systems Manager
A. Capocchi, Service Manager

Major Market Areas: Italy, Greece

Mediterranean

COMPUTER APPLICATION COMPANY, LTD.
Mesogion & Arkadias 29
Ampelokipi, Athens 516
779-8868 or 778-7708/Telex: 863-210 333 BERK GR

The exclusive Cromemco distributor in Greece, Computer Application Company, Ltd. specializes in applications relating to the proprietary software it has written for Civil Engineering, Shipping, and Hotel industries.

Key Personnel: Dennis Ioakim
Theocharis Vafiopaulos

Major Market Area: Greece

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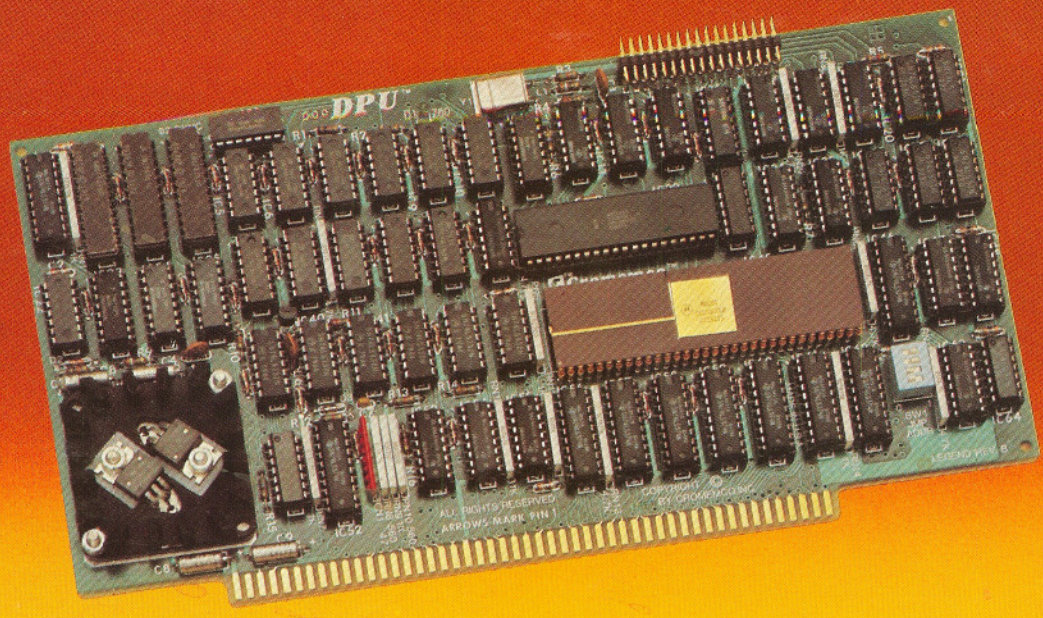

How to get started with the 68000 today

FAST, EASY, AND ONLY $995.

You won't find an easier way to get started with the 68000 processor. We've made it both a simple and low cost way.

And we don't just start you with the bare minimum. We've made it simple to have a whole plug-in system, and lots of software.

The 68000 is widely accepted as the most powerful of the new processors because of its 32-bit wide architecture, **16 megabyte** addressing range and many other features.

That's why we've selected it as the heart of our new Dual Processor Unit. **The DPU is so powerful that it easily handles complex tasks formerly requiring a minicomputer or a mainframe.**

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To get started with the 68000 you can plug this family of DPU and memory into one of our S100-bus card cages and use our PS-8 power supply. You can be in business that easy, that fast.

The new DPU and memory can also be used in our present Cromemco computer systems.

LOWEST COST

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And at a cost that's by far the lowest we know of — only $995 for the DPU.

Remember, too, that Cromemco offers a whole series of other cards that can work along with the new DPU series. More Memory. Other processors. GPIB. All kinds of analog and digital interfaces. Color graphics. Terminals and printers.

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** UNIX is a trademark of Bell Laboratories
*** CP/M is a trademark of Digital Research, Inc.

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